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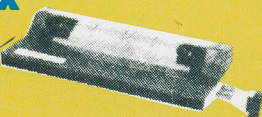
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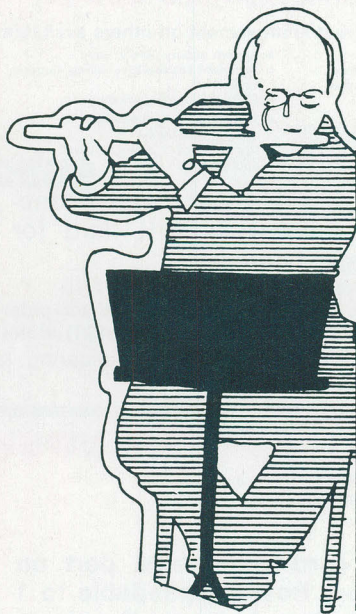
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March 1984



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Apple In The Sky

The BAUDOT information code is one of the weirdest things history has every wrought upon mankind. However, if you want to be able to see newswire transmissions on your fruit you have to be able to decode it. This feature presents the software.

32

Dedicated Terminals

If you are looking at implementing a multi user system in your place of business or your cave you'll no doubt have to get into the green tentacle en-crusted world of terminals. Here are a few eyes on the subject.

38

The Key To The IBM

The IBM's function keys are a great help to BASIC programmers... except that they want programming each time you boot the system. This simple routine solves that problem.



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Multi User Systems

If you need a seethingly powerful business system with the capability of having several users access the same data base you probably need a multi user machine. Here's a look at what they can do and how they work.

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Computers In Concert

The capabilities of computer based musical instruments could dig up the longest dead composers and set them to dancing. Check out this hard copy recital.

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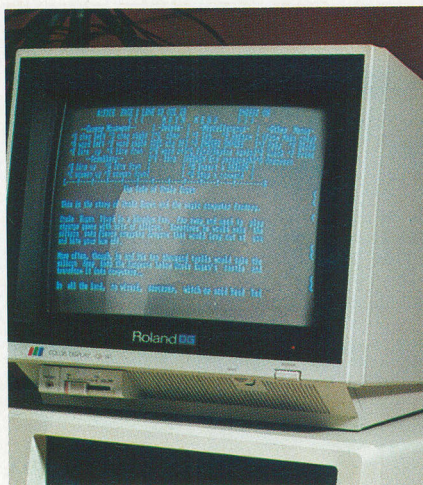
The Koala Pad Reviewed

There are piles of graphics aids for micro computers, ranging from simple light pens to the really sophisticated boxes like the Micron Eye. The Koala pad is certainly up there with the snappiest of the lot.

20

A Few Of Our Favourite Things

Buying a computer system can be an interesting exercise in bad hardware, freaky software and interfaces that don't. You might want to have a peer at these suggestions for computers from all walks of life.



50

The BEST Reviewed

We're still not sure what "BEST" stands for, but the system is pretty decent. It is a powerful IBM compatible computer, made in Canada, available in a number of configurations... and splendidly cheap.

56

VIC Routines and More 64

If you want to burrow around in the nether passages and catacombs of your Commodore computer you'll definitely need a map. This article takes a look at how to access some of the secret features of these powerful little trogs.

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Skyhook Your Apple

Everyone needs a radio teletype demodulator for their Apples. It's as natural as a soft card. Well, it is if you want to get into the fascinating world of tapping the ether for information.

70

Survey Of Apple Cards

They graph, they play, they co-process, interface, digitize, control, measure, scan convert, calculate, expand, plot, print, talk, listen, look type and catch gila monsters with large handfuls of chewing gum. They're Apple peripheral cards and we've collected them all for your edification.

72

The CP/M Menu

The CP/M operating system was originally developed by Intergalactic Digital Research... and many users of it maintain that it was intended for operation by martians. This program brings it a bit closer to Earth.

78

The Very Last Apple Unhook

Users of Wordstar on Apple compatible systems have long claimed that the computers had trolls in their ROMs designed specifically to confuse the popular word processor. Call forth this still more sophisticated troll stomper.

83

Survey of Business Computer Docs

So... you've decided to buy a computer for the office. You now have the unenviable task of choosing one and, once that ordeal is over, of implementing it. Here's a look at some of the books available to get you through it.

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Once again space considerations have forced us to postpone publication of the third module of the Stockboy inventory control package.

The Morrow Decision 1 computer on our cover is a very powerful system for multi user applications. Thanks to Micro Bazaar Computer House, 23 Westmore Drive, Unit 5, Rexdale, Ontario for the loan of it.

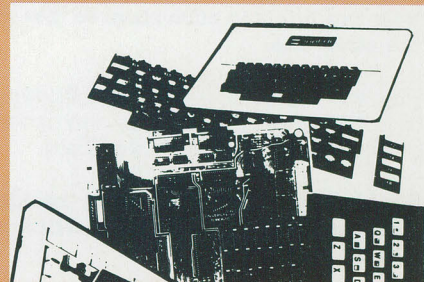
Next Month in Computing Now!

Data Base Management Systems

Data bases are extremely powerful bits of software and have perhaps the greatest potential for creating total confusion amongst their users. Next month we'll be featuring a look at some of the criteria and techniques involved in making these things come out right.

Telidon

One of the great technological mysteries of our time, Telidon is a immensely sophisticated data and graphics communication standard with almost no following outside of government types... who swear it will replace the English language some day. Next time around we'll be looking at what you can do with a micro computer and this interesting medium.



Survey of Microcomputers

Next month will bring our bi-annual roundup of all the micro computer systems available in Canada. Featuring complete information on the availability and features of these diverse machines... many of which are home grown... this overview will be invaluable to anyone thinking about buying hardware.

Beware The IBM Assembler

Machine language programming on the IBM PC is actually much easier than that of earlier chips. Ahem... well, it is once you get the newts out of the assembler. Next issue we'll be looking at some of the tricks involved in making your blue show its colours.

In The Beginning

If you're just starting out in computers you've probably noticed that there is a lot of stuff that seems expressly designed to confuse you. Next month we'll be having a shot at explaining some of the basic complexities of computers for the novice.

Dialog

It should be possible to have the computer do more than compute... I think. For example, why can't the computer perform actual tasks, like turning on lights or running the furnace?

It can. There's a whole area of computer applications in real world control. However, it isn't as easy as it sounds because a lot of the human activity the computer would be simulating involves actions and quantities which aren't clearly defined.

I'm sure that's true for complicated stuff... but, for example, how about having my 64 turn on lights in the house when I'm away so it'll look like there's someone home.

That's fairly easy. All you have to do is to have the computer's parallel port... there's a fairly handy one on the 64... drive a transistor to drive a relay or a triac and you're away. However, what happens if one of the lights doesn't work?

I don't suppose it'd be particularly easy to have the computer change the bulb. Okay... let's say the computer controls two lights in each room so that if one fails it can use the other one.

How will it know if one has failed though? It can only deal with data it can read and the only way it can get information is if something hard lands on its keyboard.

Couldn't we have photocells beside all the lights? If there's no light the computer will know that the bulb is burned out.

That sounds like a reasonable solution. However, it outlines the immediate problems in real world control and monitoring. As soon as you deal with the outside world you must immediately arrange to get feedback for the computer so it'll know whether what it's done has had the desired effect.

What about having the computer turn the furnace on in the morning so the house'll be warm when we wake up. It's fairly easy to have one switch that just ups the temperature on the thermostat by ten degrees. The computer could throw that a half hour before I tell it I've got the alarm clock set.

Suppose someone else in the family gets up early and turns up the heat before the computer has a chance to get to it. Then the computer raises it another ten degrees. It'd get pretty toasty for a while.

Right... we don't let the computer turn up the heat unless it hasn't been turned up before.

That'd require being able to sense either the setting if the control on the thermostat or the temperature of the room. The latter would be the easiest, but it would still involve some moderately fancy hardware.

What I'm thinking of is having all the right sensors and controls and stuff and actually let the computer do everything. It could manage the furnace, the lights, the air conditioner, wake us up in the morning and watch for burglars. It could basically control every electrical thing



in the house that has to be monitored by humans now.

That's imminently do—able, although not as easy as it sounds. For one thing, the computer would have to be able to control and read hundreds of data ports. It would also have to be able to measure a number of fairly tricky quantities. That's where the human intangibles come in. For instance, the humidity in your place will determine how much you feel the cold. If it's fairly damp you probably won't feel comfortable unless the heat is a few degrees higher than it would be normally. You also feel colder if it's dark outside.

The computer also has to be able to simulate the same kind of mechanical sloppiness as you find in a thermostat.

I would have thought that having computer would allow you to get away from all that.

Oh, it will... which is the problem. Suppose your house is nice and toasty and someone comes in from outside where it's twenty below. A thermostat with a spring won't do anything unless the door is open long enough to cool the spring down... certainly not in the time it takes just to enter the house. An electronic temperature sensor, on the other hand, would react immediately, and, if the computer were simply programmed to keep the temperature constant it would snap to it and fire up the furnace... shutting it down a few moments later when the door closed and the air around the sensor warmed up again. This sort of thing wastes a fortune in fuel.

In short, to make a computer replace your present mechanical control systems you have to analyse not just their overt functions but the actual procedures they go through to perform them. Sometimes what actually happens in amongst those springs, bimetalics and arcing relays is not what as it seems.

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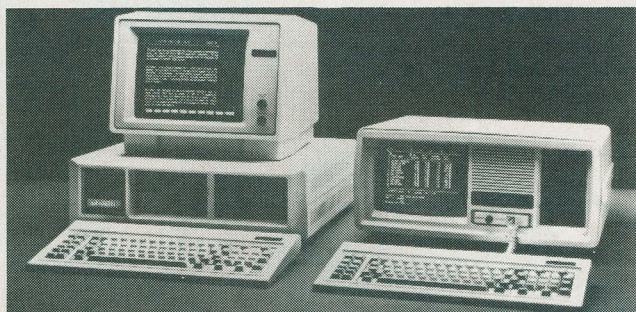
TEO Computers and Peripherals has released a one hundred and twenty-eight K IBM compatible computer. The **TEO PC.XL** includes colour display, multifunction and drive controller cards...

Reportmaker, a software package from Krepec Software in Quebec, is now available through *Computron*. Graphics of your own design may be inserted into WordStar created text with this CP/M based package...

A low cost bidirectional dot matrix printer that directly interfaces with the Commodore 64 has been introduced by *Blue Chip Electronics*. The **M120/10** can also interface to most other computers...

A new line of Canadian **diskettes** will soon be on the market. *DIDAK Manufacturing* will be producing both five and one quarter and eight inch disks with a lifetime guarantee...

The Corona Personal Computer is now being marketed in Canada by *Olivetti Canada*. Renamed the **Olivetti PC**, the IBM compatible computer is supplied with GWBASIC, MS DOS, Multimate, and PC Tutor...



Lucid, a CP/M based file manager has been announced by *Axon Development Corporation*. All forms are user definable and full screen editing is standard. The program will run on almost any CP/M, UNIX or MS DOS computer...

A low cost 2400 baud modem has been released by *MICOM Systems*. The full duplex, originate/auto answer **Model 3024** can also operate at twelve hundred baud...

Sir-Tech Software, creators of the popular Wizardry series have announced another adventure for the Apple. **Crypt of Medea** features simulated 3-D graphics and multi-word commands...

Epson QX-10 users needing more storage space may benefit from the **ComFile**, a five and one quarter inch high ten megabyte hard disk drive introduced by *Epson Canada*. The Winchester drive is compatible with both CP/M and Valdocs...

Helionetics is producing a single-board array processor for the IBM PC that will greatly speed up complex math equations. The **APB-3000PC** computes equations up to ten thousand times faster than a stand alone IBM...

Apple IIe users can effectively double their low or high resolution pixels through software with **doublestuff**, a software package distributed by *Trillium Computer Resources*...

Inexpensive **light pens** from *Tech Sketch* are presently available for the Commodore, Atari and Apple computers. The pens come with Paint-N-Sketch I software...

Mycroft Labs' popular CP/M data communications program is now available for MS DOS computers. **MITE/MS** can use four different protocols and offers an unattended answer mode...

InfoGraph 100, a presentation graphics software package for Digital CP/M systems, is now being offered by *GMS Software*. The menu driven program simplifies graph production on both paper and screen...

Hard disk storage is now a reality for Apple Macintosh computers with **Mac Disk** from *Davong*. The hard drives are available in configurations from five to thirty-two megabytes...

A one megabyte five and one quarter inch floppy drive has been introduced for the IBM PC by *Comway Electronics*. The **MegaDrive** uses double sided, quadruple density floppies...

Lines 1410 to 1440 were inadvertently left out of the **Dosdial** program on page twenty-six of February's CN!. As the program won't do much of anything without them, the uncensored subroutine follows:

```

1350 REM DO GET
1360 A = PEEK ( - 16384)
1370 IF A < 128 THEN GOTO 1360
1380 A = A - 128
1390 A$ = CHR$ (A)
1400 A = PEEK ( - 16368)
1410 RETURN
1420 REM DIAL DIGIT
1430 IF DIGIT$ = "" THEN RETURN
1440 IF ASC (DIGIT$) < 48 OR ASC
(DIGIT$) > 57 THEN RETURN
1450 A = VAL (DIGIT$)
1460 IF A = 0 THEN A = 10
1470 FOR I = 1 TO A
1480 FOR J = 1 TO 21: NEXT
1490 POKE MDM, ( PEEK (MDM) + 4)
1500 FOR J = 1 TO 43: NEXT
1510 POKE MDM, ( PEEK (MDM) - 4)
1520 NEXT I
1530 FOR J = 1 TO 510: NEXT
1540 RETURN
    
```

Word Writer and *Data Manager 2*, are two recent releases from *Timeworks* for the Commodore 64 computer. Both programs will interface with each other to exchange data...

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Computers In Concert

In a remote corner of the known universe, far from the control G bleep and the three voice music chip there exists computer music which mortal man can scarcely comprehend. At least, it certainly sounds like science fiction until you hear it for real.

by Steve Rimmer

Greg Steven pointed to the keyboard and observed "it's finally possible to say that all the sounds are in there. It's just a matter of getting them out." He went on to explain that with the latest wave of digital music technology the search for tonality on the part of a composer is largely past. The new hardware can create virtually any sound. The composer can now simply sit back and realize.

This is a profound idea, in fact, for it entails that, having mastered the hardware he has available to him a musician can play anything he can conceive. Or, alternately, she can play anything she can conceive... egalitarian sentence structures are cumbersome.

The keyboard and Greg Stevens probably require some explanation. The sounds that the two of them, and others in their respective fields, have produced can only be properly grokked with the ear. However, listening to magazines requires an infinite amount of patience.

The Sound of Bits

Remenyi House of Music has been around for about a century. It presently resides in downtown Toronto. It has a decent reputation for selling classical instruments, offering one of the finest selections of grand pianos in North America. That's the real kind, with strings as opposed to oscillators.

For several years now, however, Remenyi has been known as one of the few outlets in Canada for real computer music technology. In a large glass room off the main store Greg Steven presides over a small digital symphony. You probably wouldn't know that the keyboards within the computer music room were, in fact, anything unusual if not for the Apple



perched in the middle of them. Unlike the early computer sound systems which were designed by and for programmers, the instruments which Remenyi has been getting into are true musicians' tools. Like, you can actually play the things even if you can't program in BASIC.

"There are two aspects to all of this," Greg noted. "On one hand you have the generation of tonality and on the other there's the control of it." There are a number of ways to approach each of these.

One of the most popular of the computerized instruments is a plug in card for the Apple II. The Syntauri is a package which turns an Apple into one of the most amazing instruments imaginable. It gives the computer an organ type keyboard, a powerful sound generation system and some fairly brilliant software.

Plunked down in front of a Syntauri it's hard to know where to begin to play. The system comes with a heap of music application packages. The simplest one is a music tutor... it will teach you to deal with keyboards and display music as it is being played. For example, given a tune to get its chops into, the screen display of the Apple can zap up a score and allow you to "watch" what is coming through the speakers. Furthermore, if you are listening to a complex composition the system will allow you to "watch" selected tracks. You can check out the bass, the keyboards, the horn section...

whatever you're up for.

The system's organ keyboard remains live while it's playing a tune in its memory. You can just toodle if you want to, adding fills and such to the existing music, but the idea is to allow one to do virtual multitrack recording in the computer in real time.

Check this out here.

The Syntauri has sixteen virtual tracks, as would a sixteen track tape recorder. Each track holds a voice. You can play something on one track, "wind the tape back" in a sense... reset the computer's event counter to zero... and then add another track while listening to the first. As with real world multi-track recording one can change the mix of the tracks afterwards, edit or erase some or all of them and similar mutations and trips. However, The system has further capabilities.

To begin with, the Syntauri permits the instruments which it plays to be defined. Thus, you can play a piece with track one being, say, a piano and then substitute the voice of a saxophone for the piano parts. The next playback will be the music you played rendered on a sax. It was the first time in my life I could toodle on a violin without having to keep my head low for fear of hurling cats.

The instrument definitions one can wreak on the Syntauri, of course, are not bound by the confines of wood and brass. You can define instruments that cannot possibly ex-

ist, and play sounds entirely of your own imagination. The system has some really well thought out software tools for constructing acoustic phenomena.

Greg said that one of the interesting results of the Syntauri was that he has yet to have someone return to Remenyi looking for accessories or additional software to make the thing more flexible in a particular area. "You can stretch it so far in whatever you want to do that no one has ever really run out of what it can perform." The machine's advanced capabilities include its being able to synchronize its internal sixteen tracks to a sync track on a tape recorder to allow one to overdub beyond its internal fixed number of sound channels.

Midi Skirts

One of the most important developments in computer sound to have happened recently isn't even in the area of hardware design. It's called MIDI, the Musical Instrument Digital Interface, an information standard agreed to by a number of digital musical instrument manufacturers. In short, it permits the musician to connect a Roland keyboard to a Yamaha synthesizer to an Apple display to some other yet undisclosed box of wonders and have a reasonable assurance of the whole thing coming together.

There are limitations, Greg notes... some of the manufacturers who are applying the MIDI interface have actually gone to some lengths to allow their systems to determine whether they are looking at another manufacturer's equipment and react accordingly. However, for the most part, one can play a C on one keyboard in the system and have the rest of the network in complete agreement that a C has been sent out into the ether.

The MIDI interface is a high baud rate serial link. It transmits data in sixteen channel packets. This means that while there is only one actual physical wire between the instruments involved one can label a bundle of data channel seven, say, and it will be recognized as such by all the other systems.

The system can be used to allow one device... a keyboard, for instance... to run multiple sound generators... some synthesizers and a computer, let's say. When one hits a note on the keyboard the information about which note is struck and perhaps the velocity of the key is pumped out over the MIDI as a channel. Each instrument can check out the information and use it in whatever way it has been programmed.

However, because MIDI recognizes all the devices on it it allows very complex data communications. Thus, it can pass voice parameters and control things, like a com-



Computers In Concert

mon clock. One could play something on the keyboard, have it recorded by the computer and then played back by the computer over one of the synthesizers while one is playing something else on the other synthesizer... the permutations damage the mind in their grandure.

The result of MIDI is that one can assemble a computer music system out of all of the parts that best suit one's personal requirements.

The MIDI based hardware which Greg Steven was using included a Jupiter analog synthesizer and a Yamaha digital one. While the former was a decent noise and all, the Yamaha FM digital machine was entirely profound.

"FM sound is the hardest thing to synthesize," Greg said. He was referring to the quality of musical sound which involves slight variations in pitch over the duration of a note. While this is technically easy to do... you just throw an envelope into the control voltage input of an oscillator... it's virtually impossible to manage in an analog sense with any degree of realism.

The problem involved is two fold. To begin with, a traditional Moog type synthesizer lacks the control to do FM with sufficient subtlety to make it sound real. However, more to the point, a simple VCO does not adjust the harmonic content of a modulated waveform in the same way as sound occurs in nature. As such, analog FM sounds fairly wretched because the harmonics get muddled and atonal.

It's cool if you like car horn music, of course.

The Yamaha DX system creates its sounds under microprocessor control entirely by algorithm. As such, all the energy in a sound it heaves out is mathematically placed for each instant of time. In principal one simply writes pleasant sounding algorithms.

The system is even now being given an Apple interface to permit the player to have even better control over voice generation. Associated with a fruit, the system will be able to accept waveforms which have been generated on a high resolution graphics screen and translate them into harmonic structures.

E mu lation

The system which most freaks the limits of consciousness in Remenyi's little glass chamber doesn't even look like very much at first. Called the E mu *Emulator* it's really just an organ keyboard and a disk drive. However, within that is two hundred and fifty-six kilobytes of RAM, a fast Z-80 and some high powered software.



The computer music room of Remenyi contains quite a lot of hardware. Left to right there is the Emulator, the Syntauri, and Apple II (a real one) and a keyboard stack with a Yamaha FM synthesizer, a Roland MIDI box and a Jupiter analog synthesizer.

"I think that several people lost their minds developing this thing," Greg remarked. "It's incredibly well thought out."

The Emulator is a fantastically simple machine. It has an audio input, a keyboard and a high density disk drive. In essence, one feeds sound into the input, has the machine sample it and store it on disk and then plays the sound on the keyboard. The system can also handle sequencing and sequence storage... in other words, you can play a tune on the keyboard and have the keystrokes captured and disked into permanence.

The power of the Emulator is in its really decent human engineering and its fidelity. With a bit of practice one can have the thing make accurate samples of any sound. You could, for example, Emulate Menuin playing violin or a real Silbermann organ... assuming, of course, that you could arrange for the original sound sources to be manifested in front of your microphone for the occasion. Thereafter, you could play Menuin playing violin on the Emulator.

What makes the Emulator so splendid is that, unlike other computer music systems, it uses real acoustic noises, not oscillators, as the basis of its sound. It can, as such, reproduce much of the sonic complexity of

nature... something no wholly electronic instrument can quite manage. Its software is so sophisticated in this respect that in analysing sounds it creates a model which allows it to tweak the spectral content of the sounds it produces in emulation so they sound natural across the full span of the keyboard.

Among the more esoteric of the sounds Greg produced on the Emulator were a vocoded vocalist singing a Bach fugue... and the same piece played by a quartet of motorcycles. Dig it... the thing could do five octaves of perfectly tuned motorcycles and have semi-recognizable music coming from it.

The Chops

The promise of computer music is certainly not better sound tracks for future episodes of Star Wars. It's more a thinning of the window between the composer and reality. Given the sort of musical technology that Greg Steven is playing with down at Remenyi, the accomplished composer can better make the sounds in his or her head spew forth to actual ears.

The true power of computer music is in transcending the limits of the fingers. It allows one to produce symphonies and play every instrument, to take an hour to perfect

the performance of five seconds of sound if that's what it takes to get it right, to have the abilities of the finest players in the world at one's direction... in short, to create with no limitations save those of the imagination.

You can't blame the band anymore, y'know.

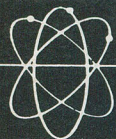
"I'm really looking forward to the next few years," Greg said. He views the technology which Remenyi offers, while extremely leading edge and sophisticated, as simply the beginning of the development of true computer based musician's tools.

"The technology has finally caught up with the composers."

CNI



The Emulator has a high density disk drive to store music and wave shapes. It can change waveshapes while it's playing a piece.



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The Koala Pad



The Koala pad is one of the nicest bits of low cost periphery available. It can be obtained to work with a number of computers including the Apple II and the Commodore 64. Your eyes will never be the same.

by Steve Rimmer

It's interesting to note that, from the point of view of a fruit, the Koala pad is simply a very peculiar set of paddles. Plugged into the system's game port the thing acts like any other controller producing vertical and horizontal values and two "fire" buttons. However, from a human point of view the Koala pad is a definite cerebral experience.

Getting visual information up on the high resolution screen of an Apple has always been a bit of an interfacing challenge. We've already looked at a number of fairly clever approaches to this

problem in previous issues of Computing Now!... the Micron Eye and the Gibson light pen, for example... and there are a host of other graphics system. However, the ideal thing is to allow one to actually draw on the screen as one would on paper.

There have been a number of "graphics tablets" created for the Apple in the past. These are widgets which allow the computer to sense the position of a stylus on a plane... and make the screen behave like the stylus is a pen and the plane a sheet of paper. However, most of them have been

expensive and many have taken a lot of getting used to.

Unlike a traditional pen and paper, your typical Apple graphics tablet acts more like a fire extinguisher full of green paint directed at a large brick wall.

The Koala pad is none of these things. To begin with, it's cheap. It comes complete with driving software for something like a hundred and fifty bucks. It's solid, easy to work with and... check this out... pressure sensitive. It produces two simulated paddle voltages based on where on the pad your

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The Koala Pad

finger, claw, fang, pencil or Captain Midnight decoder ring should press on the pad's surface. As such, it's fairly precise, and, with half an hour's practice or less, you can draw with the pad in exactly the way you would with more primitive visual implements.

The pad is a slice.

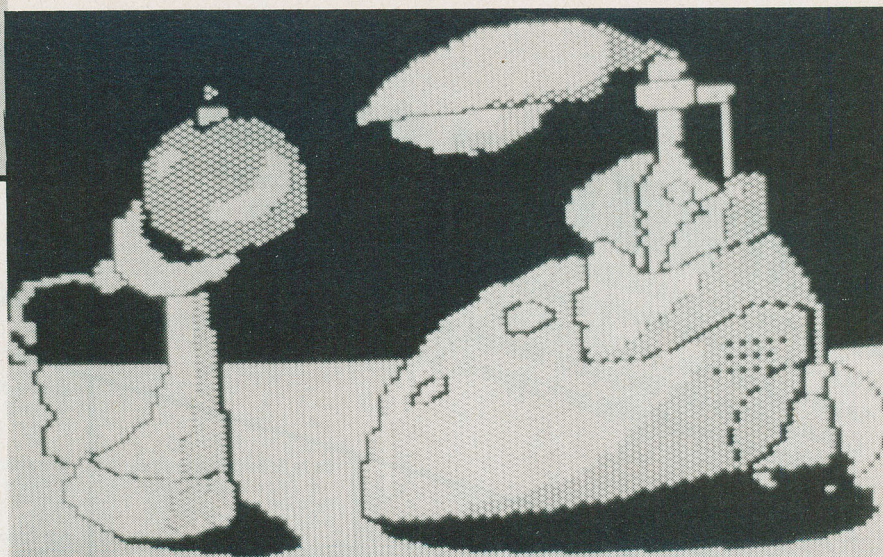
Kangaroos Too

The basic Koala pad... shown here somewhere... is a small plastic thing with a black writing surface and two large black buttons. It sits nicely on the lap... there's a fairly generous bit of cable spewing out of the back of it to associate it with a fruit. You can also lay it flat on a desk if in fact you can see yours, unlike mine, for all the disks and manuals and sundry toys that live there.

The Koala pad we got came with a number of applications packages. Some of these were kid's games which, while interesting and, in some cases, slightly warped, didn't really do the head in so much as the hardware would have suggested was possible. We'll get to these in a moment. However, the main work of the package seems to have been the Koala drawing thing and this was, to be sure, a force of some magnitude.

Booting up the "Micro Illustrator" disk presents one with a menu. However, because the pad is a visual tool... or because the programmer wanted to show off a bit... the menu uses visual icons rather than words to say its piece. The menu pretty well spells out the pad's manifest capabilities.

By placing a finger or other semisolid



This image ... the creator alone knows what of ... was done by John Rudzinski on the Koala Pad.

object on the pad a star shaped cursor can be made to happen on the screen and moved over one of the menu icons. Stabbing either of the large black buttons will select that feature of the software. Hitting a button with no cursor on the screen... with one's padding finger in space... flips the screen over to a high resolution page upon which to draw. Initially the page would be blank unless one instructed the thing to load in a previously created high res picture from the disk.

The system can save and store its images, and, as such, you can use it in conjunction with other graphics devices. One could, for example, create an image with a Micron Eye, alter it with the Koala Pad and add titles with the Applesoft Toolkit high resolution character generator.

The system supports a full house of graphics primitives. By selecting the appropriate menu icon you can use the cursor

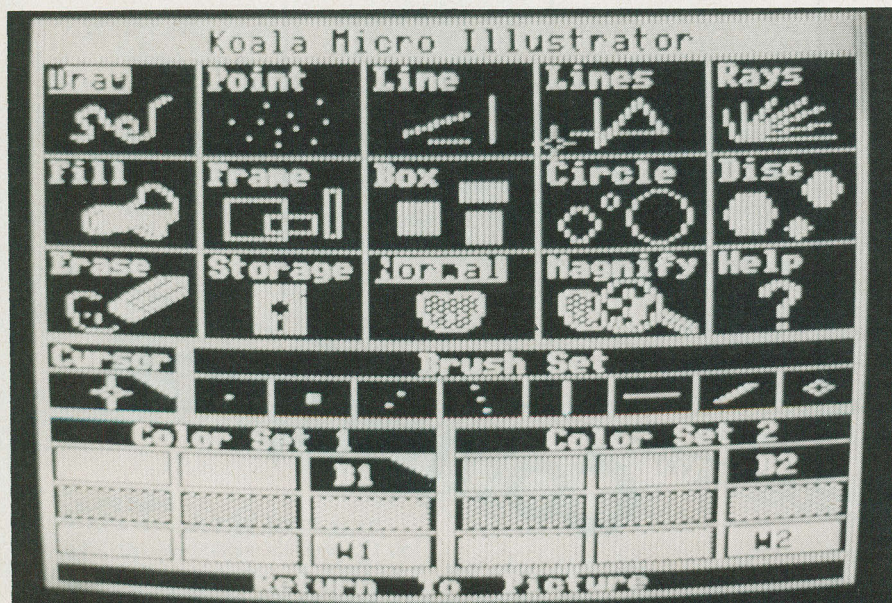
to draw freehand, lay down individual points, draw lines, rays, frames and circles and do filled in boxes and disks. There is a fill command to "paint" irregular shapes you've created with the drawing commands of the system. The filling function worked unusually quickly and never missed a pixel.

All the drawing and filling one can bring to the verge of reality can occur in any of the Apple's high resolution colours... with the same restrictions as found in any high resolution software with regard to adjacent pixels and certain colour combinations.

There are two particularly useful icons on the menu. The "magnify" feature allows you to fill the whole screen with only a few pixels... it takes the portion of the high resolution screen immediately surrounding the cursor and shows it in medium resolution blocks. As such, one has really precise control over the screen... you can manipulate it on a pixel by pixel basis with no errors due to a wobbling finger. While a little harder to get used to than many of the commands in the drawing package, this bit is enormously useful once you get tired of doing abstract art with the circles and frames.

The other thing which makes the package kind of handy is a "help" page which is callable from the menu. While it isn't a complete tutorial on how to use the illustrator, it will get you around the initial hassles involved in getting the computer to behave. In fact, given this and the fairly pictorial nature of the thing, one can easily get into it without any printed documentation at all.

The Micro Illustrator is a real blast to use. It has no glitches in it... at least, none that we found... and can turn out first rate stuff with relatively little effort. It could be pressed into service for doing technical drawings, visualizations and such, but, by far, it's best face looks at just going wild doing computer art. It's superb at that, using the potential of the Apple's graphics to a



The Micro Illustrator's menu

degree which few other graphics systems can touch.

Other Bears

The pad can be used for other things. The folks at Koala seem to think that it has a great future in kid's games and educational software. To this end, they have released a number of packages of "Koala Ware" for the yard apes.

The most bizarre of the kids' packages we had a look at was something called "Spider Eater". Spider Eater is for children of all ages provided they don't try it while under the influence of illicit substances. Perception altering drugs confronted with this thing would unquestionably scoot off down the myriad passageways of the mind they find themselves in with really unpredictable results.

It'll space your brain.

The idea behind Spider Eater is fairly simple. You are a giant face which spits Raid and lives on a treble cleff. I know what you're thinking... but this is too weird to make up. Uncool purple spiders scuttle

along beneath the cleff and occasionally hop up onto it, playing whatever note their position on the cleff represents through the Apple's speaker. The Koala pad gets fitted with a plastic overlay with an octave of a piano keyboard on it for the occasion. The operator of the face... some poor hapless kid... has to touch the Koala pad's overlay on the note which the spider has played in order to move the face to the correct position to spit Raid at the spider and zap it.

This is so inutterably strange that many game freaks will want one just to check it out. It's actually probably pretty decent to teach young kids about music and Koala pads... but it really does in a more sage head the first time it hits the tube. The graphics are lively and colourful.

The other bit of disk flotsam we got... one which children would probably find fascinating... was "Colouring Series II", subtitled "crystal flowers and snowflakes". They looked like Liberal party critical path maps to me, but, then, I didn't vote for him.

This disk is designed to be used in conjunction with the Micro Illustrator. It consists

of twenty eight abstract designs done up as high resolution picture files which can be loaded into the illustrator. Thereafter, the kids can have a high time colouring in the shapes in with the fill command of the software. Former children everywhere will get into it.

Padding

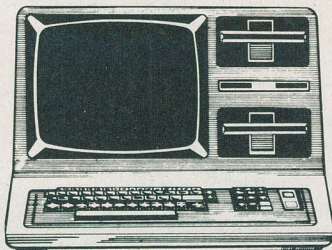
The Koala pad is a really ingenious piece of hardware, and its low cost should make it available to practically everyone. It's nicely supported by its software, which is well executed with decent human engineering and forethought. While much of the stuff available from Koala seems to be intended for use by kids the pad itself is quite capable of doing serious stuff.

The spiders are a hazard though. You never know when the little purple devils are going to come oozing out from under the cover of your fruit... slip down the cable of the Koala pad... slither out across your desk... and leap up onto the treble cleff of your life, playing Waltzing Matilda on your moustache. Argh!

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Figuring out what sort of computer to buy can be a challenge befitting one of near godly stature. Feeling less than divine of late? You may want to check out these suggestions.

by Steve Rimmer

If you're contemplating the purchase of a computer you've probably recently become aware of the etherial galactic intellects which lurk in the fourth dimension waiting to drive humans insane. Hey... don't worry about it. These things happen to the best of us.

One of the latest trips these aforementioned galactic intellects have developed to do their mental numbers on us is the marketing of microcomputers. You probably think that all the confusion that besets one upon entering a computer store is due to freaky merchandising. Hah! Every time some poor soul runs screaming from one of those places in utter desperation the galactic intellects don't stop laughing for an hour and a half.

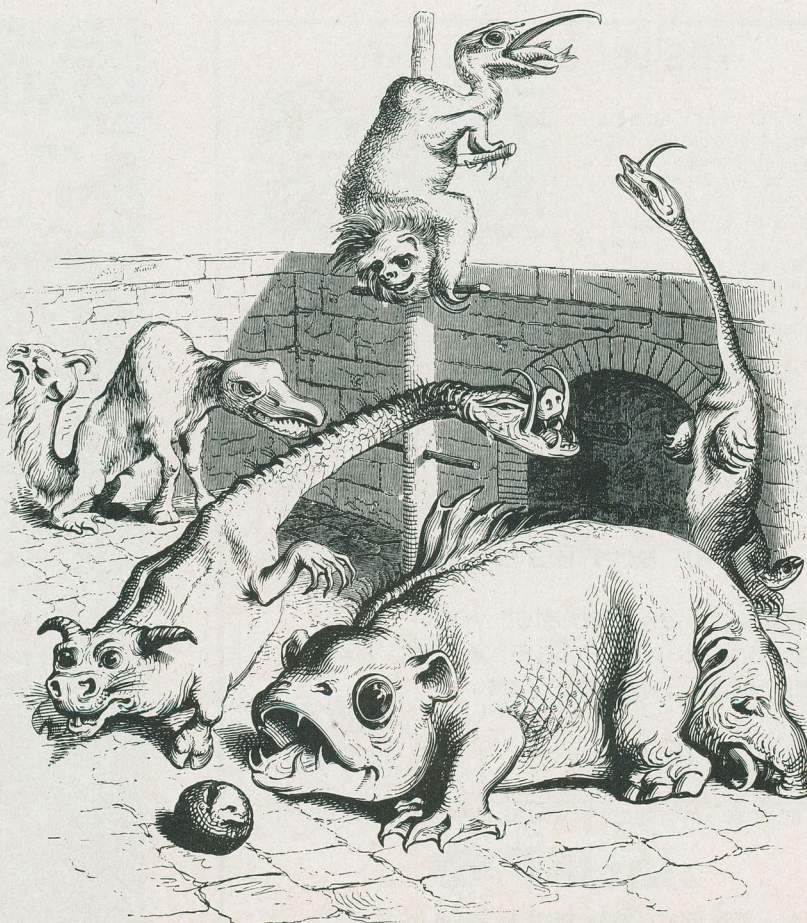
The hardest thing about choosing a computer under these circumstances is in knowing where to start looking. This is as it has been planned. You can almost hear those awesome cosmic entities scheming amongst themselves. 'So... the human wants to do a bit of computing on the weekends. Shall we have it buy a hundred dollar computer, a thousand dollar computer... perhaps even a five thousand dollar computer. Let us taunt it with disk drives and printers... dot matrix printers... daisy wheel printers... and should it be buying a clone or a genuine system? What about colour graphics... whoa ho ho!!!'

They'll go on like that sometimes until the whole dimension is full of empty beer cans and ad literature.

In order to get the galactic intellects really teed off, we have decided to put together some representative systems. While we are not necessarily recommending that you zip right out and buy the exact hardware we've assembled here, you will probably get a pretty decent idea as to what level of computer you should be looking at for your application if you check out these toys.

Now, before you read any further, you should be warned that there is a danger in

A Few Of Our Favourite Things



all this. The galactic intellects are not in any way pleased about this thing, and there is the definite possibility that they will cause the staples in this issue to become carnivorous watchworms which will slither across the cover and devour your Timex if you show any signs of enlightenment or understanding. Therefore, we recommend that you look real unconcerned while you're reading this and keep an eye on your wrist at all times.

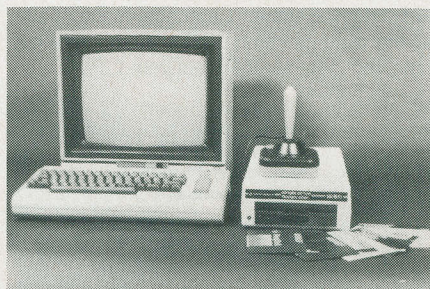
If you hear a noise that sounds like the cap coming off a three parsec long beer bottle followed by a long gurgling laugh dive for cover.

A Beginner's System

If you're going to get into computers for the first time your primary concern should probably be the acquisition of a system which will confront you with the least possible number of high tech mysteries. You won't want to worry about warm boots, hexadecimal notation or operating systems. The important thing is to start getting into pro-

gramming and using the toys.

I think that the Commodore systems remain the most user friendly and approachable of all the small computers, certainly of the relatively cheap ones. The 64 seems to be the main consumer deal at the moment, rumours of larger and more



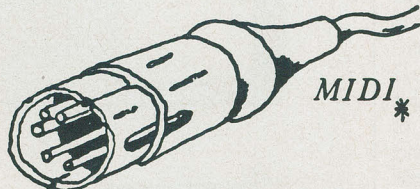
powerful plastic boxes not withstanding, and it's got bells and tin whistles hanging off it to amuse the average user for micro-eons on end. It's fairly self contained but has a reasonable amount of flexibility for expansion.

The nicest thing about the 64 is its

BASIC, a derivation of the original PET BASIC developed by Microsoft in the late seventies. This features, among other things, full screen editing for effortless program alterations and a very loose and forgiving syntactical structure. The command and function allotment of Commodore BASIC is a bit sparse, but this is not really a drawback. There's a lot less stuff to wade through in getting into using a 64 than one would find in many small systems.

The cheapest way to get a 64 up and running is by hooking it to a regular TV and a *Datasette*, it's second banana program cassette recorder. However, this only works for about a week, as, very shortly, the rest of the members of one's family begin to want the set back, and one's system time gets restricted to those hours when all that's viewable are gospel revival meetings and test patterns. Thus, outfitting the 64 with a monitor... preferably a colour one, such as the Commodore 1702 shown here... becomes a worthwhile investment. The image quality of one of these monitors is vastly

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A Few Of Our Favourite Things

better than that of a broadcast tube anyway.

The other popular peripheral to get for a Commodore system is a disk drive... in this case, the 1541. This replaces the Datasette as the system's mass storage device. It allows one to LOAD and SAVE programs with vastly greater speed than is possible with tapes and also gives the system access to all kinds of software which is only available on disk... especially some really high brow games, like Castle Wolfenstein and David's Midnight Magic. While much slower than the drives on professional systems, the 1541 is a glorious advance over cassettes. Owners of 1541s very quickly begin to regard owners of Datasettes as plebs.

The other highly wonderful accessory available for the 64 is not even particularly expensive, but in some respects it is the most powerful attachment available. The *Commodore 64 Programmer's Reference Guide* ranks as one of the most complete pieces of documentation available for any small computer. It features BASIC programming instruction, a section on machine language, all sorts of information about the insides of the system and sample programs. It will prove invaluable for anyone owning one of these powerful little beasts.

**Commodore 64
Commodore 1702 Monitor
1541 Disk drive
Joysticks
Programmer's Reference Guide**

A Low Cost Business System

Many small business owners who want to get into computerization are attracted by the availability of really cheap power in the form of Apple clones. These systems... stuffed with enough cards... can be pretty decent machines, running their own version of CP/M and, as such, Wordstar, dBase II, Supercalc and, in fact, the single largest library of business software on the planet.

The basic fruit, however, can do none of these things. It uses a disk operating system called DOS which, while in many ways simpler to understand than CP/M, cannot support most of the programs which make the system so useful. In order to expand on DOS one needs add a number of plug in cards to an Apple.

To begin with, an Apple has a rather primitive screen display which isn't really suitable for professional applications. An eighty column card will solve this by providing it with a full size screen format and real upper and lower case. The system also lacks a printer port... you need a printer

card as well. The one shown here, an Apple Dumping, is a powerful card with all sorts of features to allow one to better control the currently available full feature printers. Then there's a memory card, which adds sixteen thousand characters more RAM to the Apple, a disk drive controller to, predictably, run the system's disk drives and, finally, the all important Z-80 card to give the thing the right tools to facilitate CP/M.



Needless to say Apple clones are not the simplest systems to set up. However, they are very cost effective. The system shown here is the absolute rock bottom way to run professional business software without having to actually steal something.

If you are going to do word processing, filing or financial planning on a computer you will invariably want a printer. Hard copy is the only true reality there is. One of the best low cost printers we've come across is the Gemini 10X. It is extremely reliable, surprisingly fast and has far more features than most business applications ever call for. It can do regular, expanded and compressed type, bold, double striking and italics, alternate character sets, block and bit mapped graphics and a number of specialized symbols. It has both tractor and friction feeds and plenty of programmable options.

As in the case of Apple clones themselves the owner of a Gemini should expect to have to do some meddling with the fiddly bits before getting the results one expects out of the machine but, for many users, the minor hassles inherent in these low cost systems are far outweighed by the cost savings they represent.

Apple clones are available from an uncountable number of dealers... check out the ads in this issue if you don't have a local head selling them. At present, most of them are imported from Taiwan and Korea, but there are a few that are still locally grown... most notably the Surplustronics Surf board and the Peach.

**Apple Clone
Zenith Monitor
Two Drives**

**Software
Z-80 Card
16K Card
80 Column Card
Printer Card
Gemini 10X**

A Medium Sized Business System

The if800 is probably the only computer which can claim to be a system all by itself. Without any external peripheral devices at all it features two double density disks drives, a colour monitor and a printer all in one case. It runs both CP/M 2.2 and its own unique operating system to drive a customized BASIC package. It's a powerful and unusually convenient system.

While a bit radical in its styling, the if800 is not a bad choice of a medium priced desk top computer. For one thing, it doesn't take up all that much of the desk, although one would not want to put the thing in front of anything you ever expect to see again. It's a decidedly vertical box. However, it eliminates the usual clutter of cables that one associates with personal computers and does virtually everything one generally needs in a system.

Most business applications would call for the if to run under its primary operating system, CP/M 2.2. The CP/M package



which comes with the computer has been highly customized for this particular application, and works extremely well.

The upper strata of the if are occupied with a large colour monitor. It is, to be sure, one of the best quality tubes available in any box, with resolution equalling that of many black and white screens. However, being a colour display it can be set up to look like any popular colour of monochrome monitor for business applications. If you would rather have an amber monitor as opposed to a green screen one the if will oblige.

This facility sounds like a meaningless

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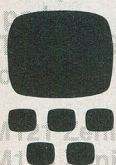
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frill, but, in fact, the customized software packages available for the system which make use of its colour are noticeably easier to use. Wordstar's menus are easier to read, the display of Supercalc can be scanned over quicker and so on. The screen supports full colour high resolution bit mapped graphics, too, which lends itself nicely to doing business graphs and plots.

The if can, of course, run with any CP/M based program. Those which are not customized to use its screen display capabilities will simply run using whatever default colours the user has set the machine up for.

Among the features of if800 CP/M is a really superb configuration utility. It allows every useful parameter of the system to be changed with a few keystrokes. The keyboard keys themselves can all be redefined for specific applications. The screen colours can be adjusted. The basic operations of the system can be set up in any way the user chooses.

Integrated into the if800 is a small dot matrix printer. While not suitable for doing mass mailings, it produces acceptable type for drafts, reports and memos. It's a fairly fast little beast and can handle a number of sizes of print under software control. It also has the facility being able to do "screen dumps"... it will transfer the contents of the screen, be they characters or graphics, directly to a sheet of paper exactly as they appear on the tube.

The if handles a number of things well. It can be a word processor and business planning tool, a graphics system, a file manager... even a terminal into a larger system. It seems to be very well supported by its dealers.

**if800
CP/M**

A High End Business System

It's probably worth noting that many of the business microcomputers of the current demiera are actually considerably more powerful than what were called minicomputers in the late seventies. A high end system can hold as much as a megabyte of memory, store ten or twenty megabytes on a self contained hard disk and run a blinding array of software.

The Columbia system... that what's in the picture... is an IBM compatible computer. It runs under either CP/M86... nice, but weird... or MS DOS, the glorious staple tongue of IBM's everywhere. It will run virtually all of the swelling library of software for the IBM PC. This includes word processing programs like Wordstar and Perfect Writer, huge spreadsheet things like

Multiplan and Lotus 1-2-3, dBase II... which can do enormous things with the system's huge hard disk... and many more specialized packages that can manage applications never before possible with the smaller eight bit systems.



The power of the Columbia lies in a number of areas. To begin with, it can access more memory than can conventional eight bit computers. This means that programs that are memory dependant can be used on larger projects. Spreadsheets, for example, are designed in such a way that the size and complexity of the model you can set up is directly proportional to the amount of RAM the system has available for the sheet to run on. While sixty four thousand bytes may seem like a lot, one quickly exhausts it with sheets of even middling grandure. The potential half megabyte of the Columbia makes it possible to use this sort of program in ways never before possible.

At the same time, the Columbia is fast. In fact, it's fast in a number of ways and for a number of reasons.

The processor of the Columbia runs at speeds not greatly in excess of those attained by less sophisticated systems. However, it is architected differently from the older chips and, as such, it does more things in the same amount of time... resulting in an effective decrease in the time it takes to execute a program. At the same time, the vast instruction set of the system's processor has allowed programmers to write code which is orders of magnitude more efficient than that intended for earlier chips. The result is that, in many types of professional programs, operations which used to involve noticeable and often times irritating delays on smaller machines run on the Columbia apparently instantaneously.

The Columbia can drive both black and white and RGB colour monitors. The tube we've included with it for this system is an Amdek Colour III. It's capable of displaying both text and the full colour graphics the system is capable of.

The system has both serial and parallel

printer ports. The TTX printer also shown here can be driven through either. It's a pretty fast daisy wheel printer with hardware selectable pitch and line space sizes. It can use a variety of type sizes and styles and takes both single sheets and fanfold paper. It's a good trip.

The Columbia system is one of the most powerful single user microcomputers available and will fulfill pretty well all of the requirements of a small or medium sized business.

**Columbia with hard drive
Amdek Colour III monitor
TTX Daisy Wheel
MS DOS**

A Low Cost Hacker's System

If you want to really get into the guts of a computer there is no better system to meddle with than an Apple clone. There are a number of reasons for this, actually. The Apple has its guts better documented than virtually any other system available. It's easily expandable to encompass all sorts of applications through its flexible peripheral slot system. However, most important, the Apple is simply a very well designed computer.

Even a moderately stuffed clone system offers a wide variety of areas in which to explore. To begin with, there is Applesoft and, if you don't particularly care for that language, a language card and disk based integer BASIC can be added to the system fairly cheaply. In addition, one can acquire Apple PASCAL, Logo, graphic FORTH and a host of other tongues to use on a straight up fruit. You can also burrow down into the nether reaches of the system and program it in 6502 machine code. The firmware on board supports a built in machine language monitor. There's even a mini-assembler in there.



The hardware capabilities of a clone are pretty impressive for what one costs. Perhaps most interesting of its repertoire of functions are Apple high resolution graphics. While not so sophisticated as

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A Few Of Our Favourite Things

those of an IBM, they still allow one to create near arcade quality images on the screen and Applesoft provides commands to make plotting points and drawing lines extremely simple.

Adding a Z-80 soft card and CP/M gives one another processor to play with. It will run two versions of Microsoft BASIC provided with the system disk and specially tailored for the Apple. One of them supports the same graphics commands as does Applesoft plus a few enhancements. In addition, virtually every popular computer language is available for the Apple running CP/M, including PASCAL, FORTRAN, COBOL, CBASIC, C, ADA, PILOT and LISP. One also has access to some of the finest machine language programming tools in existence.

The cards that will plug into the unused peripheral slots of the Apple are no less interesting. There are cards to do music, graphics, telecommunications, real world control and monitoring, esoteric data entry, speech... the list is impressive. Actually, it's in this issue. Check out the survey of Apple cards elsewhere in this magazine.

The Apple also lends itself to modification. One of the most useful tools in this respect, an EPROM programmer, is shown here. This allows one to adapt the firmware chips of the system and its cards to enhance it or adapt it to other purposes. This one, the Multiflex programmer, is extremely simple to use. It runs in any of the system's slot... except slot zero... and comes with software to handle most of the common chips.

We've also included one of the low cost EMP modems with this system and a PDA 232C card to drive it. The Apple makes a good telecommunications system; this pair allows one to communicate with other computer users and with bulletin board systems. The EMP modem features direct connection and both answer and originate tones. The PDA card is a very powerful serial interface with a built in dumb terminal and an optional CP/M support package.

**Apple Clone
Cards
EMP Modem
Excel EPROM Blaster
Zenith Monitor
PDA Card**

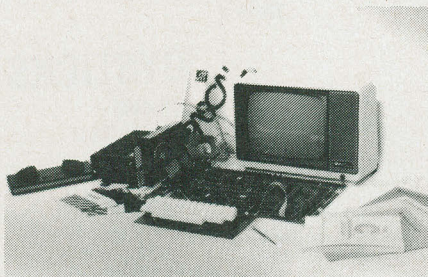
A More Powerful Hacker's System

If you are primarily interested in playing with software you'll probably want a really powerful CP/M based system to hack with. The Exceltronix single board computer is a

decent choice in this respect. It runs CP/M 2.2 at up to six megahertz and is stuffed full of options and gadgets to tinker with.

The single board has been designed to be inutterably flexible. If you look carefully at the photo of the system you'll probably notice that much of the board is not even stuffed. These empty sockets are available for expansion and customization of the system, for adding additional features to the board and for setting the computer up to do specialized tasks. As such, the single board is inexpensive to buy and still easily upgradable.

The board has a full eighty by twenty four character video section built on. It also has a parallel ASCII keyboard port... if you don't dig the keyboard shown here you'll find pots of others available at really low cost.



The board can support up to a quarter megabyte of bank switched RAM. It has two built in RS-232 serial ports and a twenty four line parallel port in addition to a regular Centronics type interface which can be used to drive a printer. With some ingenuity on the part of the programmer, there is no reason why the board need be limited to a single user. If you feel like experimenting with multi-user operations the Multiflex economy terminal interfaces to the board through a single serial cable.

The single board can drive up to four floppy disks. It will support both five and a quarter and eight inch drives in any combination, including double density beasts. There is also a real time clock on board.

Unlike most other low cost single board CP/M based systems, the Multiflex board is designed around the S-100 buss. There is a single S-100 slot built onto the board which can either be filled with one peripheral card or used to drive an expansion card cage. S-100 cards are available to provide the system with sophisticated communications capabilities, real world control, music, extraordinary graphics and countless other features.

The single board computer is available with a complete CP/M 2.2 package, including a custom written BIOS. Running

CP/M the system can access the whole library of software available for this operating system, including word processors, heaps of languages, telecommunications software and even games and educational material. For the user who enjoys working with a system and developing it to suit his or her own needs, the single board can be every bit as powerful as some of the vastly more expensive business systems that are currently becoming available.

The CP/M package comes with a number of useful programs to assist in setting up the board to suit one's particular needs. This includes a huge configuration program which permits virtually every alterable quantity in the computer to be adjusted with one menu driven utility. It is also bundled with the usual Digital Research programs, ASM, PIP, DDT and so forth, plus a number of useful public domain programs.

The single board is a nicely designed and put together system ideal for the user who wants to grow into something really large. It's has been designed and built entirely in Canada.

**Multiflex Single Board Computer
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A Computer for the Kids

Radio Shack makes a lot of computers. They've been into them almost since the beginning of the microcomputer industry. The Color Computer is actually a fairly venerable low cost system, having existed for a considerable time now in several forms. The current model has a full size QWERTY keyboard and even costs less than the original smaller, less convenient box. It drives a standard colour TV and does everything a computer should do... especially if you feel it should be doing it in technicolour.

The screen display is capable of rendering sixteen lines of thirty two characters and up to a hundred and ninety two by two hundred and fifty six dots of high resolution graphics... you can also get fewer dots with a greater choice of colours. The system can generate program controlled sound. A fresh from the carton Color Computer has sixteen kilobytes of RAM.

The Color Computer is based on the Motorola 6809 processor chip, which is actually generally found in industrial control applications. However, many of the characteristics which make it good at such things also make it fairly suitable for this

system. It is extremely fast, and so video games played on the little mite can be both complex and lively. They can also be small... the 6809 allows fairly efficient coding. As such, the computer is reasonably powerful without being notoriously expensive.

The system is designed to have its firmware attached to it through ROM packs. As it stands, the Color Computer is somewhat brainless and capable of only simple thoughts. However, plugging in a game pack makes it into a wholly dedicated game machine. Stuff it full of an advanced BASIC pack and it cheerfully turns its mind to complex programming. It also features a cassette interface for mass storage, with optional disk drives for the really over-indulgent parent.

The Color Computer is extremely ruggedly put together. Its case is well suited to disregarding a few blunt instruments and experiments in the effect of gravity on injection moulded plastic.

If one really gets into Color Computing... Computerizing?... it's probably



worth noting that there is a fair bit of stuff that one can get to hang off the system. The first accessory one would probably want to acquire would be a set of joysticks. These are sort of a staple for playing games. There's also a trackball mouse available. In addition, the computer's memory can be expanded out to a full sixty four kilobytes. You can expand the on board BASIC to include a larger repertoire of commands. There are also expansion boxes to allow having multiple packs plugged into the computer at one time and to add telecommunications facilities to the machine.

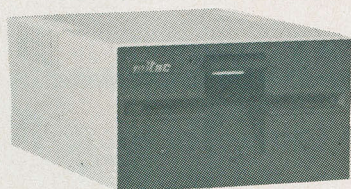
The system comes with a fairly good beginner's guide to using the Color Computer. Being distributed by Radio Shack, assistance with the machine is fairly easy to come by.

Radio Shack Colour Computer
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The Commodore 1702 monitor and Wico joystick were supplied by Computer Fare of Toronto. **CNI**

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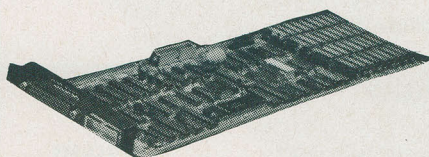


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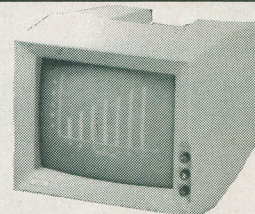


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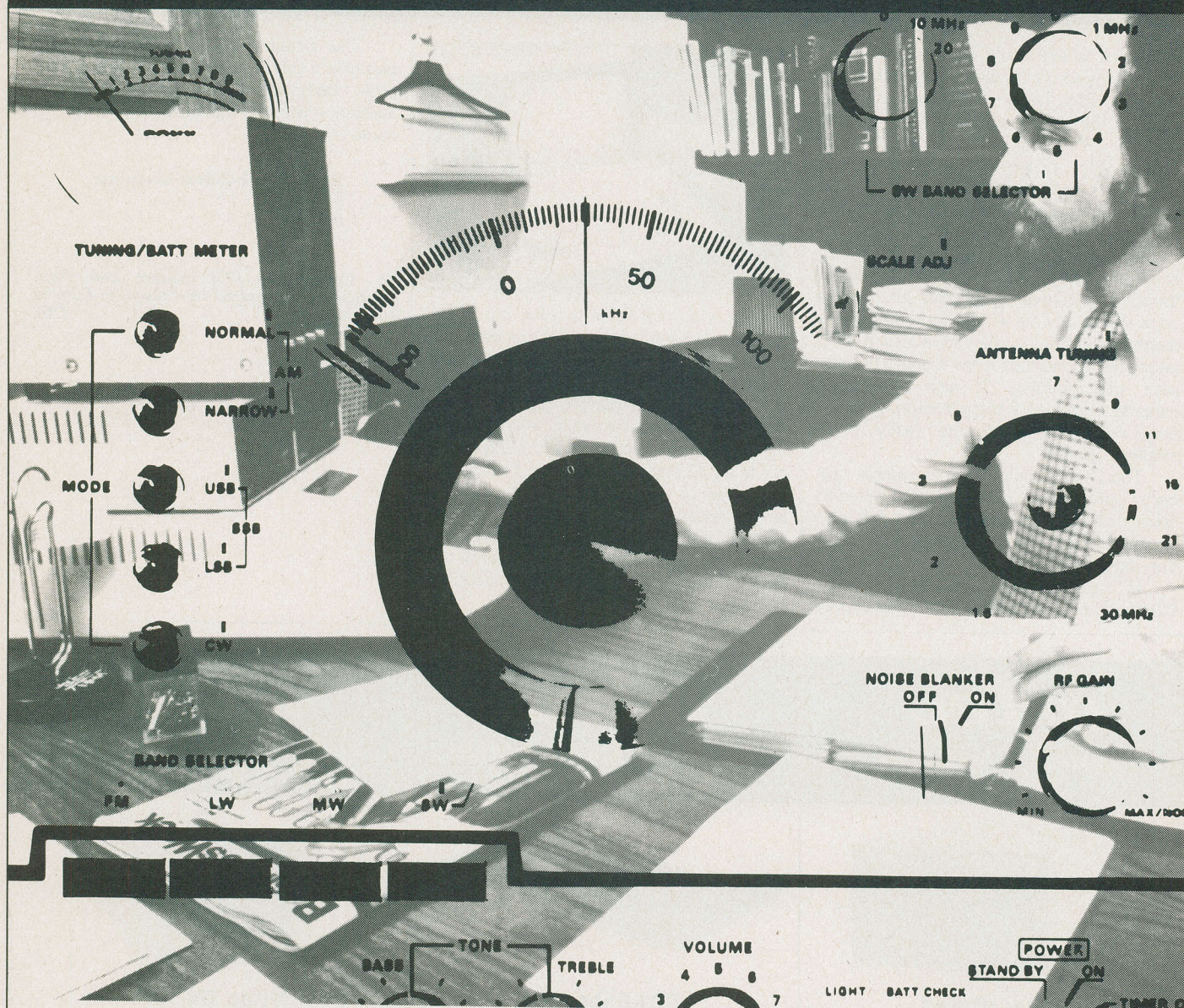
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Apple in the Sky



The short wave bands are full of noise and propaganda and ... hmm ... computer data. Here's a way to tap some off it out of the sky and into your Apple.

by Steve Rimmer

One of the reasons that the Apple II ... and, yes, the miriads of clones that tag along behind it ... have all done so well is the countless applications you can hang on them. It's probably true that no system, at even twice the price of a clone, can do so much. Albeit, many of the features of the Apple are not exactly state of the art, but there's plenty of room to grow with.

This article is about an application

which is anything but state of the art. It predates the Apple and, in fact, microcomputers in general. It involves BAUDOT, teletypes and short wave radio. It's heavily 1929.

If you own a short wave radio you will probably have noticed that there is a lot of stuff on the bands besides voice and words. Some of it is pretty freaky. Aside from 'spherics and other natural and possibly supernatural phenomena out there, there

are some bizarre man made signals. The short wave bands carry morse code, telefax image transmissions and teletype signals... to name but a few.

This feature is concerned with the latter of these. With a bit of code and a few electronic doo dahs you can actually receive text over your radio and see it on your Apple.

We had a look at the basis of radio teletype transmissions in the October 1983 edition of *Computing Now!* in the "Byte Of Short Wave" article. However, for the sake of completeness a quick glance back is probably in order.

BAUDOT is something like ASCII, except that it was designed for use with unspeakably primitive mechanical teletypes. In order to transmute it into something your computer can make sense of it must first be demodulated and then converted into reasonable character values.

especially if you don't mind the smell of solder flux. All you need is an RTTY demodulator such as the one in the October article or, better still, the high brow super enhanced model in this issue. This will take the beeps and bops from the short wave and make them into digital pulses. Because they are transmitted as characters with start bits and stop bits already attached that's how they'll decode. Fortunately, the structure of a BAUDOT character when sent serially is much the same as that of an ASCII character modemed into eternity so once the character has emerged from the demodulator it can be dealt with by fairly simple off the shelf hardware.

```

;=====
;
;      RADIO TELETYPE TRANSMISSION
;      DECODER FOR APPLE II
;      COPYRIGHT 1984 (C)
;      STEVE RIMMER
;
;=====
;
;      PDA CARD MUST BE IN SLOT 2
;
START   EQU    $2000       ;WHERE CODE RUNS
PCOL    EQU    $COAB       ;BASE OF B250
STAT    EQU    $COAD       ;B250 STATUS PORT
LTERM   EQU    $C000       ;KEYBOARD PORT
STROBE  EQU    $C010       ;KEYBOARD STROBE
INPRT   EQU    PCOL        ;SLOTH
POINT   EQU    $2B         ;POINTER TO SCREEN
HORIZON EQU    $24         ;LINE LENGTH
CLS     EQU    $FC5B       ;CLEAR SCREEN
;
;      ORG      START
;
;      MSB      ON          ;IGNORE
;
;      JSR      INIT        ;SET UP B250
;      JSR      ONLINE      ;ON LINE MMIO
;      JSR      TERM        ;RECEIVE BAUDOT

```

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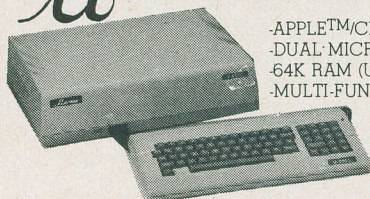
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Apple in the Sky

```

RTS          ;BACK TO APPLE
;
INIT  NOP          ;SET UP 8250
      LDA    #$00
      STA    PCOL+1 ;SET DLAB
      STA    PCOL+4
      LDA    #$81
      STA    PCOL+3
      LDA    #$E6    ;LSB FOR 45.45
      STA    PCOL
      LDA    #$09    ;USB FOR 45.45
      STA    PCOL+1
      LDA    #$04    ;5 BIT, 1.5 STP
      STA    PCOL+3
      LDA    #$00
      STA    PCOL+1 ;CLEAR DLAB
      RTS
;
TERM  NOP
      LDA    INPRT
      LDA    INPRT ;EAT GARBAGE
;
TERML NOP
      LDA    LTERM ;CHECK KEYBOARD
      CMP    #$A0 ;FOR SPACE BAR
      BEQ    TQUIT ;SNUFF IT IF HIT
      LDA    STAT ;GET STATUS
      AND    #$01 ;MASK BIT
      CMP    #$01 ;CHAR READY?
      BNE    TERML ;LOOP
      JSR    CUROFF ;KILL CURSOR
      LDA    INPRT ;GET CHARACTER
      AND    #$1F ;MASK HIGH BITS
      JSR    CONVERT ;MAKE INTO ASCII
      ADC    #$7F ;APPLE-SCII
      JSR    TYPE ;PUT IT ON TUBE
      JSR    CURON ;CURSOR ON
      JMP    TERML ;NEXT CHARACTER
;
TQUIT NOP
      JSR    CUROFF ;CURSOR OFF
      JSR    OFFLINE ;SAY 'BYE
      LDA    STROBE ;CLEAR KEYBOARD
      RTS          ;BE GONE
;
TYPE  NOP
      JSR    $FDF0 ;DISPLAY CHAR
      RTS
;
CONVERT NOP
      CMP    #$1B ;IS IT FIGS ON?
      BEQ    SHIFT ;SET FLAG
      CMP    #$1F ;IS IT LETS ON?
      BEQ    SHIFT ;SET FLAG
      LDX    CASE ;PEEK FLAG
      CPX    #$1F ;IS IT SET TO
      BEQ    LETTERS ;LETTERS
      JMP    FIGURES ;OR FIGURES
;
SHIFT  NOP
      STA    CASE ;UPDATE FLAG
      RTS
;
LETTERS NOP
      LDX    #$01 ;POINT TO TABLE
      LETLOOP CMP    LTABL,X ;GET BYTE
      BEQ    CMATCH ;COOL IF MATCH
      INX          ;NEXT BAUDOT
      INX
      CPX    #$42 ;WE DONE?

```

```

      BCC    LETLOOP ;LOOP
      LDA    #$00 ;NO LUCK
      RTS
;
FIGURES NOP
      LDX    #$01 ;POINT TO TABLE
      FIGLOOP CMP    CTABL,X ;GET BYTE
      BEQ    FMATCH ;COOL IF MATCH
      INX          ;NEXT BAUDOT
      INX
      CPX    #$42 ;WE DONE?
      BCC    FIGLOOP ;LOOP
      LDA    #$00 ;NO LUCK
      RTS
;
FMATCH NOP
      DEX          ;POINT TO ASCII
      LDA    CTABL,X ;GET IN A
      RTS
;
CMATCH NOP
      DEX          ;POINT TO ASCII
      LDA    LTABL,X ;GET IN A
      RTS
;
CURON  NOP
      LDA    #$60 ;FLASHING BOX
      JMP    SHOWIT ;POKE TO SCREEN
      CUROFF LDA    #$A0 ;BLANK SPACE
      SHOWIT LDY    HORIZON ;LEN OF LINE
      STA    (POINT),Y ;POINTER
      RTS
;
OFFLINE NOP
      LDX    #$00 ;ZERO INDEX
      OLOOP LDA    OLMESS,X ;GET BYTE
      CMP    #$00 ;DONE?
      BEQ    OQUIT ;QUIT IF YES
      JSR    TYPE ;SHOW BYTE
      INX          ;BUMP INDEX
      JMP    OLOOP ;LOOP
      OQUIT RTS
;
OLMESS DFB    $8D,$8D
      ASC    'RTTY OFF LINE'
      DFB    $8D,$00
;
ONLINE NOP
      JSR    CLS ;CLEAR SCREEN
      LDX    #$00 ;ZERO INDEX
      NLOOP LDA    ONMESS,X ;GET BYTE
      CMP    #$00 ;DONE?
      BEQ    OQUIT ;QUIT IF YES
      JSR    TYPE ;SHOW BYTE
      INX          ;BUMP INDEX
      JMP    NLOOP ;LOOP
;
ONMESS DFB    $8D,$8D
      ASC    'CN! RTTY TERMINAL ON LINE'
      DFB    $8D,$00
;
;LETTER TRANSLATION TABLE
LTABL  DFB    $41,$03,$42,$19 ;A,B
      DFB    $43,$0E,$44,$09 ;C,D
      DFB    $45,$01,$46,$0D ;E,F
      DFB    $47,$1A,$48,$14 ;G,H
      DFB    $49,$06,$4A,$0B ;I,J
      DFB    $4B,$0F,$4C,$12 ;K,L
      DFB    $4D,$1C,$4E,$0C ;M,N

```

```

      DFB    $4F,$1B,$50,$16 ;O,P
      DFB    $51,$17,$52,$0A ;Q,R
      DFB    $53,$05,$54,$10 ;S,T
      DFB    $55,$07,$56,$1E ;U,V
      DFB    $57,$13,$58,$1D ;W,X
      DFB    $59,$15,$5A,$11 ;Y,Z
      DFB    $20,$04,$0D,$0B ;SPACE,CR
      DFB    $0A,$02,$1B,$1B ;LF,FIGS
      DFB    $1F,$1F,$00,$00 ;LETS,BLANK
;
LTABL  DFB    $00,$00
;
;FIGURE TRANSLATION TABLE
CTABL  DFB    $2D,$03,$3F,$19 ;-,/
      DFB    $3A,$0E,$24,$09 ;:,$
      DFB    $33,$01,$21,$0D ;3,!
      DFB    $26,$1A,$23,$14 ;&,#
      DFB    $38,$06,$27,$0B ;8,'
      DFB    $28,$0F,$29,$12 ;(,)
      DFB    $2E,$1C,$2C,$0C ;.,.
      DFB    $39,$18,$30,$16 ;9,0
      DFB    $31,$17,$34,$0A ;1,4
      DFB    $07,$05,$35,$10 ;BEL,5
      DFB    $37,$07,$3B,$1E ;7,;
      DFB    $32,$13,$2F,$1D ;2,/
      DFB    $36,$15,$22,$11 ;6,"
      DFB    $20,$04,$0D,$0B ;SPACE,CR
      DFB    $0A,$02,$1B,$1B ;LF,FIGS
      DFB    $1F,$1F,$00,$00 ;LETS,BLANK
;
CTABL  DFB    $00,$00
;
CASE   DFB    $1F ;CASE FLAG
      LST    OFF ;IGNORE
;
;END OF SOURCE

```

for use with another card pretty simply if you have to.

Program one is an downside radio teletype terminal. That is, it receives only. Its sole function is to take the BAUDOT characters it finds oozing in through the serial port and display them on the screen as readable letters. It's involved because BAUDOT is so bizarre.

BAUDOTS and BAUDASHES

To begin with, there is no mathematical correlation between BAUDOT and ASCII... you can't just shift some bits or add a constant to one to make it into the other. In fact, there is no logic to BAUDOT at all in terms of its numeric structure... the letters aren't even in order. It is defined by the simplest arrangement of gears, levers, pawls and widgets in a teletype.

BAUDOT is divided into two cases. Letter case contains the letters "A" to "Z". Figure case contains the numbers and some punctuation. There is no lower case and, since teletypes worked with rolls of paper, no cursor controls except for carriage returns and line feeds.

The thing is, BAUDOT is a five bit code and, if you ponder on this, you'll find that

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Apple in the Sky

this does not permit it to display enough unique characters to hold the sixty four it can, in fact, manage. The designers of the system got around this by adding two characters to the set. When a teletype encounters the FIGS character, \$1B, it shifts to the figures set and produces all figure characters until it gets a LETS character, \$1F, at which point it starts doing all letters.

To look at things another way, each BAUDOT value can be either a letter or a figure depending which of the case characters has most recently been received by the teletype.

Ziping back up to the present day, the software to make BAUDOT into ASCII is a tad involved. In essence, it must run each character it gets through a translation table to see what the corresponding ASCII value is. However, it has to pick which table it uses on the basis of the most recent case setting... which, of course, must be retained somewhere for the occasional reference.

The program shown here is written in 6502 machine code to make it lively. It might have just worked in BASIC, but one would have risked losing the odd character. Furthermore, some radio teletype stations use higher baud rates than the traditional teletype speed of 45.45 baud, which definitely entails a fast decoder.

The main part of the program is a variable length loop. The short trip is a check for the status port of the serial card. It will keep doing this until there's a character waiting. At such time as something does show up it will do the long road and display the character. This involves basically what we've just talked about.

To begin with, the program extinguishes the flashing cursor so as not to leave a blinking box at the end of every line. Then the CONVERT routine checks for a case switch character, setting the CASE flag accordingly if it gets one. The program defaults to letters which may produce some garbage when the thing first comes on line if you drop into the middle of a string of figures.

Assuming we don't have a case character the CONVERTer chooses a table to scan on the basis of the current case. The two tables are at the bottom of the listing. Each table is set up with every first character ASCII and every second one its BAUDOT equivalent, so the scanning routine starts one byte in and compares the character in the accumulator to each even entry in the table. If it gets a match it backs up one byte and fills the accumulator with the corresponding ASCII value.

The program will keep displaying BAUDOT until you hit the space bar on

your fruit, at which point it will return to Applesoft.

Codes

Making this program happen is a minor ordeal. If you have an assembler you can simply type in the source file shown here and assemble it. This listing was done with EDASM from the Applesoft toolkit, but TED or LISA or, in fact, any 6502 assembler program will do as well. You can also use the mini assembler if you keep track of where the labels live, and then save the code to disk. It runs from \$2000 to \$2196 if you do it exactly as it's shown here.

The cheap and dirty approach is to use the BASIC loader in program two. This has all the bytes of the machine code program stored as DATA, POKEing them into place when run so the result is the same as if you had assembled the file and BLOADED it. However, this thing has a checksum in it, so if you make a mistake in typing in some of the DATA it will hiccough and tell you that there is a fruit bat in your shreddies.

Once you have the whole works together, demodulator humming and hooked up, all you'll need are some signals. Short wave radio teletype signals sound like modem noises... a high pitched whine which tweedles back and forth between two distinct pitches. Not all signals use BAUDOT and not all are sent at 45.45 baud, so you may have to do some hunting for something to test your toys on.

The short wave radio teletype transmissions carry a variety of things. There are amateur radio ramblings, a lot of which is devoted to computer babble and, perhaps more interesting, commercial news wire transmissions from overseas which still use huge short wave transmitters to get their masses of information across the pond. Some of these will require adjusting the protocol of the terminal and the filter settings of the demodulator.

Ride That Wave

Having information spew onto your screen from out of the sky is quite fascinating. You can get into it for simple curiosity or use your system to check out world news and commercial data passing through the ether. In any case, playing with these things is a blast.

Just keep an eye out for those pawls and ratchets trying to make their homes in your fruit. Electro-mechanicals die hard.

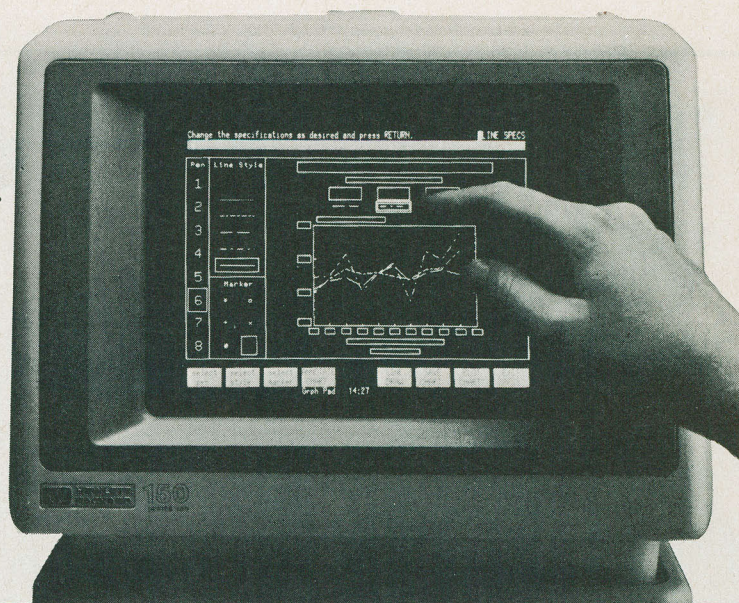
Program 2

```
>10 REM RTTY DECODER
    COPYRIGHT (c) 1984
    STEVE RIMMER
20  FOR X = 8192 TO 8599
30  READ A
40  POKE X,A
50  B = B + A
60  NEXT X
70  IF B < > 42118 THEN INVERSE = PRINT
    "THERE IS AN ERROR IN THE CODE": NORMAL
    : END
80  CALL 8192
90  END

1000 DATA 32,10,32,32,225,32,32,45
1001 DATA 32,96,234,169,0,141,169,192
1002 DATA 141,172,192,169,129,141,171,192
1003 DATA 169,230,141,168,192,169,9,141
1004 DATA 169,192,169,4,141,171,192,169
1005 DATA 0,141,169,192,96,234,173,168
1006 DATA 192,173,168,192,234,173,0,192
1007 DATA 201,160,240,31,173,173,192,41
1008 DATA 1,201,1,208,239,32,183,32
1009 DATA 173,168,192,41,31,32,107,32
1010 DATA 105,127,32,102,32,32,177,32
1011 DATA 76,52,32,234,32,183,32,32
1012 DATA 190,32,173,16,192,96,234,32
1013 DATA 240,253,96,234,201,27,240,14
1014 DATA 201,31,240,10,174,150,33,224
1015 DATA 31,240,8,76,148,32,234,141
1016 DATA 150,33,96,234,162,1,221,18
1017 DATA 33,240,32,232,232,224,66,144
1018 DATA 245,169,0,96,234,162,1,221
1019 DATA 84,33,240,9,232,232,224,66
1020 DATA 144,245,169,0,96,234,202,189
1021 DATA 84,33,96,234,202,189,18,33
1022 DATA 96,234,169,96,76,185,32,169
1023 DATA 160,164,36,145,40,96,234,162
1024 DATA 0,189,208,32,201,0,240,7
1025 DATA 32,102,32,232,76,193,32,96
1026 DATA 141,141,210,212,212,217,160,207
1027 DATA 198,198,160,204,201,206,197,141
1028 DATA 0,234,32,88,252,162,0,189
1029 DATA 245,32,201,0,240,225,32,102
1030 DATA 32,232,76,231,32,141,141,195
1031 DATA 206,161,160,210,212,212,217,160
1032 DATA 212,197,210,205,201,206,193,204
1033 DATA 160,207,206,160,204,201,206,197
1034 DATA 141,0,65,3,66,25,67,14
1035 DATA 68,9,69,1,70,13,71,26
1036 DATA 72,20,73,6,74,11,75,15
1037 DATA 76,18,77,28,78,12,79,24
1038 DATA 80,22,81,23,82,10,83,5
1039 DATA 84,16,85,7,86,30,87,19
1040 DATA 88,29,89,21,90,17,32,4
1041 DATA 13,8,10,2,27,27,31,31
1042 DATA 0,0,0,0,45,3,63,25
1043 DATA 58,14,36,9,51,1,33,13
1044 DATA 38,26,35,20,56,6,39,11
1045 DATA 40,15,41,18,46,28,44,12
1046 DATA 57,24,48,22,49,23,52,10
1047 DATA 7,5,53,16,55,7,59,30
1048 DATA 50,19,47,29,54,21,34,17
1049 DATA 32,4,13,8,10,2,27,27
1050 DATA 31,31,0,0,0,0,31,255
```


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Dedicated Terminals... Why?



If you're setting your sights on a VDT and aren't sure exactly what to look for, it might be prudent to read the following.

by Adam Naiman

Alphanumeric visual display terminals are today the most interface between man and the computer. We've all seen them at airports, banks, offices and schools. They take many sizes and shapes and can be integrated into virtually any type of computer system.

Most standard visual display terminals associated with computer type operations have the following three components in common. Each has a keyboard that can generate a full alphanumeric character set. Each has a monitor that can display the characters generated by the keyboard. Finally each has the capability to send and receive data via communications lines to a local or remote computer.

Now that you know the basic components of a terminal and everyone has told you that you need one or more for your new computer system, you'd probably like to know how to determine what to buy and how much you'll have to pay. After all, in Canada alone, you can choose from over one hundred and fifty different CRT models manufactured by over a hundred vendors. So where do you start?

Sizes And Styles

First of all, you must identify your type of computer application. By that I mean how smart your computer program is and how much intelligence or how many features you want your terminals to possess. Remember, the general rule of thumb is that the more features you put in a terminal the more expensive it will be.

In order to simplify matters, the terminal vendors have divided visual display terminals into three generally accepted categories; dumb, smart, and user programmable. Although there is some overlap between these categories, the basic definitions of the categories are as follows.

Dumb terminals offer a limited number of functions. Most feature teletype or basic communications compatibilities. They are used strictly to enter and receive data usually to and from a much more sophisticated computer. Smart terminals possess extended features such as data editing and formatting. In some cases, a user can tailor the terminal to fit his own application via a limited degree of pro-

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Dedicated Terminals . . . Why?



gramming such as format creation and communications definition. User programmable, or intelligent, terminals feature complete user programmability. The vendor typically provides an operating system and all the necessary programming tools to permit the user to custom tailor his terminal to a specific application.

After having considered the type of terminal you need, you should now consider what features you should look for in a reasonably priced terminal.

Display Features

Information displayed on the screen of a CRT is generally arranged according to an orderly format consisting of the maximum number of printed lines per screen and the maximum characters per line. The most common display capacity is nineteen thousand and twenty characters arranged in twenty four lines of eighty characters. Many vendors now offer one hundred and thirty two character display lines so as to eliminate the need to revise or patch computer data designed for hundred and thirty two standard column printers.

In most terminals, the number of characters that can be stored by the terminal's display memory equals the maximum screen capacity. Thus you need two K or approximately two thousand characters of memory to store an eighty by twenty four screen. The more memory a terminal contains the more data it can store locally.

If local highlighting features are required by the operator, look for the availability of the display features in table one.

Table 1

- Underline — highlights significant information by causing it to blink off and on. Useful to indicate urgency or an error condition.
- Blink — highlights significant information by causing it to blink off and on. Useful to indicate urgency or an error condition.
- Bold — highlights significant information by displaying it at a different brightness level. Useful in forms-oriented applications.
- Blank — transmitting sensitive information, but not displaying it on the screen. Useful in security applications.
- Reverse Video — highlighting significant information by displaying a negative image of it. Also useful in forms-oriented applications.
- Scroll — this feature moves all displayed lines of data up or down by one line as a new line is added and an existing one removed. This permits the user to scan through a volume of data to locate key information.
- Paging — this feature defines and stores two or more decrees pages of data and displays the selected page. This permits users to quickly scan a large document in the memory of a terminal.

If you also require text editing facilities most commonly associated with smart terminals, you must ensure that a combination of the features in table two are included in the terminal.

Table 2

- Character Insert - the capability to insert a character into an existing line of displayed text.
- Character Delete - the capability to delete a character from an existing line of displayed text.
- Line Insert - the capability to insert a line of text into existing text.
- Line Delete - the capability to delete a line of text from existing text.
- Erase - the capability to erase a character, line of text, paragraph of text, or the complete screen.

Finally, most businesses use printed forms for daily activities such as billing, ordering, payroll and so forth. Some CRT terminals can duplicate the printed form on the face of the screen, and data can be keyed into the blank spaces just as the typist enters data into a printed form. This "fill in the blanks" approach to data entry requires a "protected format" capability. Visual display terminals that incorporate this feature treat the fixed format differently from keyed or variable data. Field identifiers such as "name" or "salesman number" are protected from inadvertent key entry and data entry is confined to the variable fields ... blank spaces ... following the field identifiers.

Having completed entry into the fixed format, the operator transmits the data to the central computer. A feature called "partial screen transmit" promotes transaction speed and communications line economics by transmitting only the keyed data and not the form. The fixed format remains displayed and the "blanks" are erased for the next entry. This feature is quite useful for transmitting only the variables or a portion of the displayed data such as a field, line or block.



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Dedicated Terminals . . . Why?

Keyboard Features

The keyboard of a visual display terminal should be carefully examined to ensure that it possesses all of the required features of the desired application. Does it have a typewriter or data entry layout? Data-entry keyboards have a numeric keypad embedded in the alphabetic part of the keyboard which is accessed via the numeric shift. They usually consist of a slightly different layout than the typewriter layout most secretaries are familiar with. For word processing applications the typewriter layout is more useful, while in form oriented applications the data entry layout is more suitable.

Keyboards that can either fit flush against the display or be located some distance away via a cable connection are referred to as detachable keyboards. This feature provides configuration flexibility and operator convenience.

The more expensive terminals generally come equipped with "program, mable function keys". These are special keys whose character codes are interpreted by the user's program. A function key is used to reduce the number of required input keystrokes, which in turn saves time and minimizes the number of input errors. Depressing a function key could, for example, instruct the system to "sell one airline seat" or "call up form B".

Many of today's terminals contain numeric keypads. This is a special keyboard feature that includes a set or block of about ten numeric keys, usually located to the right of the main keyboard. These numeric keys are arranged in a calculator format and are particularly useful in applications that require a high volume of numeric entries or arithmetic calculations.

Communications Features

It's hard to discuss display terminals without briefly covering some basics on data communications, as nearly every display terminal contains a communications interface that enables your terminals to com-



municate with a central computer. As many people find data communications even more mysterious than computer technology, I'll try to keep the pertinent items brief and simple.

Computer data can be transmitted in two modes, these being half duplex or full duplex. In half duplex mode transmission can occur in both directions ... to and from the terminal ... but not simultaneously, while in full duplex transmission can occur simultaneously in both directions. Usually half duplex transmission is sufficient.

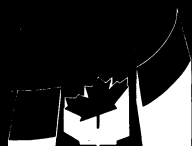
The techniques by which computer data is transmitted are called asynchronous or synchronous. A synchronous transmission is characterized by the transmission of data in irregular spurts, where the duration of time can vary between successive transmitted characters. The immediate transmission of typed data without buffering is a good example. Synchronous transmission implies the transmission of data in a steady stream. The time interval between successive characters is always precisely the same.

The "handshaking" method or line discipline used by a terminal to talk to a computer is called communications protocol. The three most commonly used protocols are ASCII, IBM's Binary Synchronous Communications (BSC) technique and IBM's Synchronous Data Line Control (SDLC) line discipline. Other large computer manufacturers such as Burroughs, Honeywell and Digital Equipment Corporation have produced their own communications protocols. When selecting a CRT terminal, you must be absolutely sure that it uses the same communications protocol as the computer with which you are going to communicate with or the terminals will be of little use to you.

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The Key to the IBM



The IBM's BASICA package has a number of features to make life easier on the lowly programmer. Here's a utility to make one of them work for you.

by Steve Rimmer

Microsoft disk BASIC has evolved through a number of strata of development and it's gotten pretty well refined over the years. The CP/M based implementation would seem to have all of the bells and whistles one could want in such a thing. However, the real programming revelation is in BASICA, the version which comes with MS DOS for the IBM PC.

BASICA has more doo dahs in it that can be counted on both hands of an Arc-turian Megatarsal. It's powerful beyond all measure and description, but, more to the point, it has features which make programming in it more convenient than BASIC ever thought it could be.

One of the really fine things happening in BASICA is the ability to program the function keys of the PC. These ten keys can each be made to emit any string you fancy with a simple command. Thereafter, you can, for example, hit key one to RUN, key two to LIST and so on.

The only drawback to this is that you have to load the keys each time you boot BASIC if you don't fancy the default definitions... which aren't all that useful for most general programming.

The KEYWORD program shown here should largely nullify this hassle, however.

When run, it loads a set of your own personal definitions in from a disk file, zaps them into BASICA's function key string buffer and then cheerfully kills itself to make way for your next program. At the same time, it has facility to allow you to edit the current set of definitions and replace the existing disk set with a new one.

Multi-functional

The program is fairly simple. All articles with programs in them say this to play with your head and lull you into a false sense of security, but it's actually true in this case. KEYWORD consists of a simple editor and some disk routines. It can be entered and run in minutes.

The only really vital aspect of it is that it erases itself as soon as it has run, so do be sure to SAVE it *prior* to the inaugural flight.

When you run KEYWORD it gets the contents of the file FUNCTION.KEY from the disk. If there is no file by this name there it creates one and assumes that all the definitions are blank.

In the main editing mode of KEYWORD one selects a key to define or alter by hitting the appropriate function. Unfortunately, these things return the strings of their definitions even if there is a program running.

This creates an interesting problem as, for example, if key one holds the string "LIST" and key two holds "LOAD" both will return the character "L" when hit.

To get around this, the program redefines the keys so that they hold the numbers from zero to nine.

If you hit a key to edit the cursor will leap up to the corresponding line on the screen. The system will then look for input. A line is terminated by the ESC key rather than a carriage return as, in many cases, one will want a carriage return imbedded in the string programmed into the key. If you hit a carriage return the editor will treat it as any other printable character... it uses character one hundred and twenty eight, a small "C" with the tail of a newt dangling below it... to represent carriage returns.

Keyed Up

The KEYWORD program can make developing software a lot quicker. It obviates a lot of typing and other unpleasant manual stuff and makes the function keys work for you.

There are some standard definitions you might want to adopt. For example, keys one and two are usually set to RUN and

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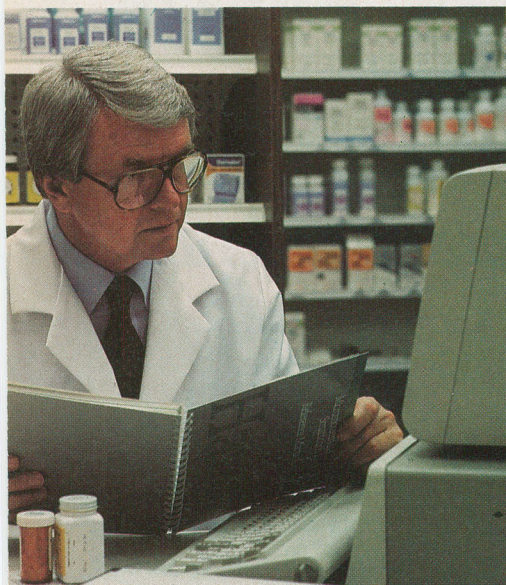
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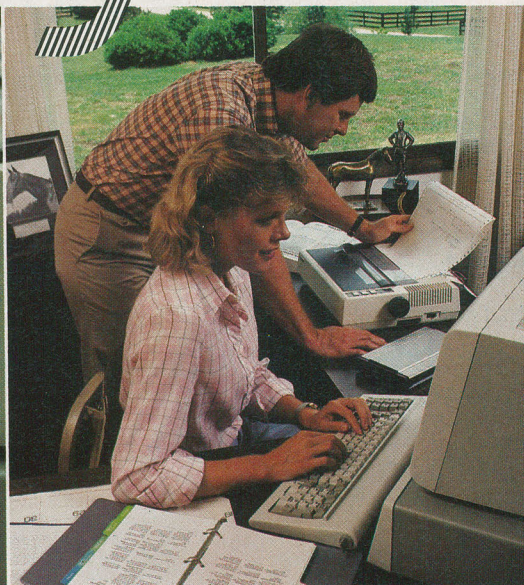
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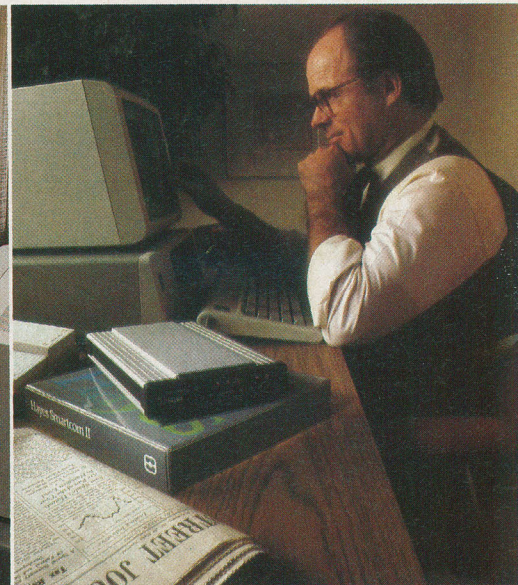
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The Key to the IBM

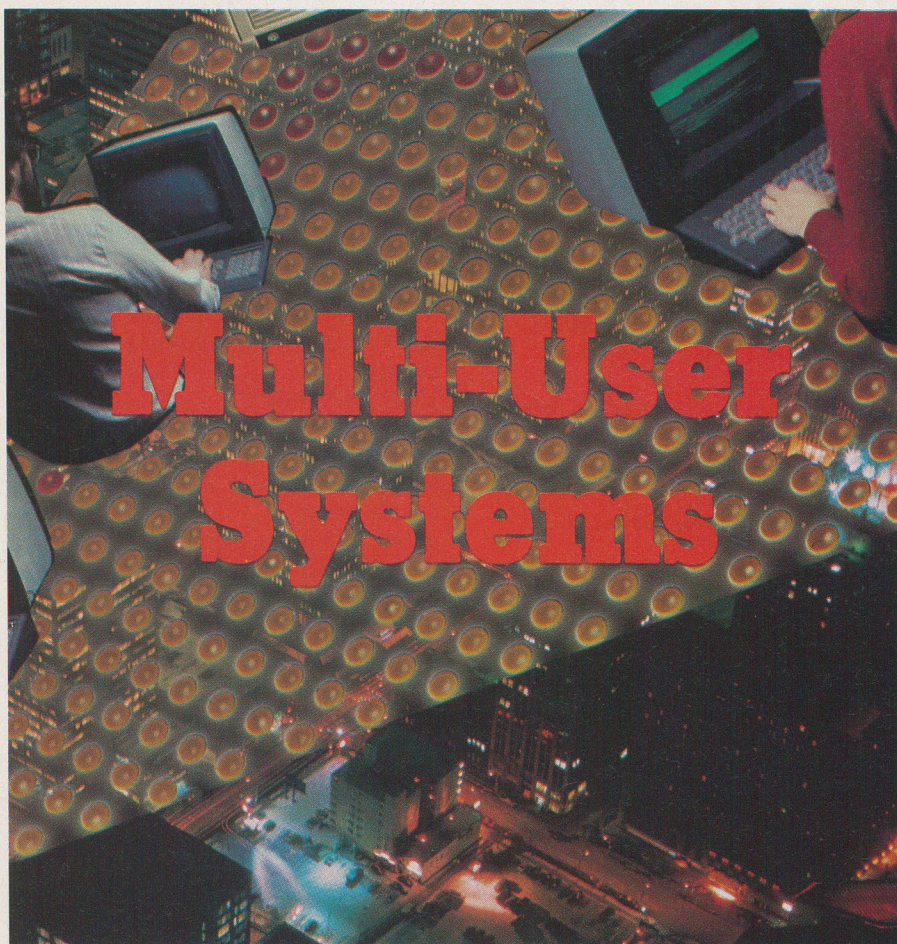
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0 ,,,,,,,,,,,,,,,
20 ,
30 ,      KEYWORD FOR THE IBM PC
40 ,      Copyright (c) 1984 Steve Rimmer
50 ,
60 ,,,,,,,,,,,,,,,
70 ,
80 W=20 : FLAG=0
90 PASS$="ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567
    890!@#$%^&*()-+=;?<>.,' " + CHR$(34)
100 A1=10 : A2=40 : P=10 : DIM F$(10)
110 FILE$="FUNCTION.KEY"
120 GOSUB 420
130 CR$=CHR$(13) : ESC$=CHR$(27) : CS$=CHR$
    (128) : BS$=CHR$(29)
140 RUB$=BS$+" "+BS$ : DEL$=CHR$(8)
150 CLS
160 PRINT TAB(30) "FUNCTION KEY EDITOR"
170 GOSUB 660
180 LOCATE P,1,0
190 PRINT TAB(A1)"f1 "F$(1)TAB(A2)"f2 "F$(2)
200 PRINT TAB(A1)"f3 "F$(3)TAB(A2)"f4 "F$(4)
210 PRINT TAB(A1)"f5 "F$(5)TAB(A2)"f6 "F$(6)
220 PRINT TAB(A1)"f7 "F$(7)TAB(A2)"f8 "F$(8)
230 PRINT TAB(A1)"f9 "F$(9)TAB(A2)"f10 "F$(10)
240 LOCATE P+10,A1,1
250 PRINT "Enter key to change, RETURN
    to quit. ";
260 C$=INPUT$(1)
270 C=ASC(C$)
280 IF C=13 THEN 370
290 FLAG=1
300 IF C<48 OR C>57 THEN 260
310 F=C-47
320 IF INT(F/2)*2=F THEN AX=A2+3 ELSE AX=A1+3
330 LOCATE (P-1+(F/2)),AX,1
340 GOSUB 470
350 LOCATE 1,1,0
360 GOTO 180
370 REM get ready to get lost
380 IF FLAG = 1 THEN GOSUB 760
390 GOSUB 600
400 CLS : PRINT STRING$(24,10);
410 NEW
420 REM redefine keys
430 FOR X=0 TO 9
440 KEY X+1,RIGHT$(STR$(X),LEN(STR$(X))-1)
450 NEXT X
460 RETURN
470 REM input a line
480 PRINT SPACE$(N):
490 LOCATE (P-1+(F/2)),AX,1
500 A$=""
510 WHILE C$<>ESC$
520   C$=INPUT$(1)
530   IF C$=DEL$ AND LEN(A$)>0 THEN
       A$=LEFT$(A$,LEN(A$)-1) : PRINT RUB$:
540   IF INSTR(PASS$,C$) <> 0 AND LEN(A$)
       <N THEN A$=A$+C$ : PRINT C$:
550   IF C$=CR$ THEN A$=A$+CS$ : PRINT CS$:
560 WEND
570 IF A$="" THEN 590
580 F$(F)=A$
590 RETURN
600 REM load function keys with matrix
610 FOR X=1 TO 10
620   IF INSTR(F$(X),CS$)<>0 THEN MID$(F$(X),
       INSTR(F$(X),CS$),1)=CR$
630   KEY X,F$(X)
640 NEXT X
650 RETURN
660 REM get functions from disk
670 ON ERROR GOTO 840
680 OPEN "I",#1,FILE$
690 INPUT #1,F$(0)
700 IF F$(0)<>"KEYWORD" THEN CLOSE : GOTO 760
710 FOR X=1 TO 10
720   LINE INPUT #1,F$(X)
730 NEXT X
740 CLOSE
750 RETURN
760 REM put functions on disk
770 OPEN "O",#1,FILE$
780 F$(0)="KEYWORD"
790 FOR X=0 TO 10
800   PRINT #1,F$(X)
810 NEXT X
820 CLOSE
830 RETURN
840 REM file not found trapper
850 CLOSE
860 OPEN "O",#1,FILE$
870 PRINT #1,"KEYWORD"
880 CLOSE
890 RESUME 750

```

gram you're working on.

I also have a key defined as RUN 'KEYWORD', but it's a good idea to have that one in there without a carriage return so you can hit ESCape if you stab the thing by mistake.



The powerful multi user multi tasking systems which are now becoming available to high end business users offer enormous power in very small, and relatively inexpensive, boxes. Comparable in many ways with mini computer systems, these machines have applications in a number of areas of business.

by Garry Frankel

As time goes by it is getting harder and harder to draw a clear distinction between the various classes of computers. If one takes a computer with a traditional microprocessor but has three simultaneous users, each doing two things at once, is the result a micro mainframe or mainframe micro? This problem is further complicated by the fact that one can now

use mainframe-like operating systems on microcomputers. It is these operating systems that make small computers work like the big ones. Unless you have a program the performance can be very confusing.

What we will be looking at in this article is an example of what happens to small computers when one can implement a large computer operating system on them at a reasonable cost. While these large scale systems are quite diverse in their capabilities and cost, the system we'll be looking at here should be a fair example of the power of multi user microcomputers.

The Toys

In "creating" a hypothetical multi user system, we will, to begin with, need some hardware. A sufficiently powerful system would require at least a quarter megabyte of RAM and a hard disk drive. The best of such systems use the newer processors, like the Motorola MC68000, but multi user facilities can be implemented on IBM PC types and even on an old Z80.

The system will require two or three RS232 ports so that it can talk to several terminals or modems at once. In a broad sense, this is about it for the hardware. You can, in fact, get a system for three users for about ten thousand dollars complete with a whole bunch of software.

It is the computer's operating system that runs all the hardware and lets your programs do what you want them to. The types of operating systems that we are interested in are those that let more than one person do more than one thing at a time. This is called a "multi-user multi-tasking" operating system. It means pretty much what it says.

What we really want to talk about is an operating system that can work on mainframes, minis and micros, one that provides a multi user micro with the facilities of a really big system and that does big system stuff. There is such an operating system. It has existed in the world of mainframes for years under the name of Unix.

There are very few actual implementations of UNIX by its original name on microcomputers today. Most micro versions are adaptations that are usually compatible with what the mainframe people know as versions six and seven. One of the most common is Xenix by Microsoft. This has been set up to run on 8088/86 machines such as the IBM PC and on MC 68000 machines like the new Radio Shack multi user machine and the Apple Lisa. The version that we'll be referring to in this article is Micronix by Morrow. It runs on an eight bit Z80 system by the same manufacturer. Micronix is compatible with UNIX version six but more on that later.

At the centre of all Unix systems is what is called the *kernel*. This is the axis about which all the rest of the system revolves. The kernel is the interface between the hardware and the software, controlling the hardware so that it becomes virtually transparent to the user. This is different than is seen in CP/M or MSDOS where the end user must be aware of which disk drive is being used and what files are located on which drives or user areas. In UNIX this all taken care of for you.

None of the software in UNIX does anything directly with the hardware. It all goes through the kernel. Around the kernel are different layers or *shells*. Shells contain all the files that are used by the user. Some of these files are common to all users. For example the programs that take care of the multi-tasking and other such invisible operations are in every user's shell. In addition, each user's shell is customized to contain the files that they use or need access to. What you end up with, actually, are layers

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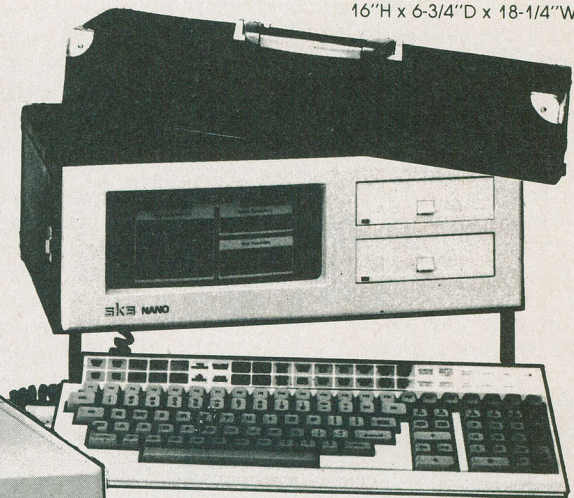
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Multi-User Systems

of shells. Each one has different layers according to what the user needs.

Perhaps it will help in understanding this to observe that in Unix everything is stored as a simple file. All files are stored and handled in the same manner. For example, Unix treats text and program files in the same manner, unlike CP/M which always requires a .COM after each program file so that it can be used as a program. Even a directory in UNIX is stored as just another file.

The file structure in UNIX confuses many users who are new to this operating system. CP/M uses what is called a horizontal file system. In other words all the files are just layed out in one level. If you do a DIR command in CP/M it will list all the files in the directory of the disk you are logged into. In UNIX the files are in layers, so that you work your way down through what looks like the roots of a tree.

The Palace Unix

All shells include what is known as the *root* file. The root contains the kernel as well as those files we referred to as doing all the invisible work. Using the Micronix system as an example, the root directory for my shell contains the files *a*, *bin*, *core*, *cpm*, *dev*, *etc*, *lost+found*, *micronix*, *tmp* and *usr*. It should be noted that in UNIX all files and instructions are done in lower case.

The file *bin* contains most of the neat UNIX utilities that we shall look at in greater detail later. *cpm* is the file where most of the CP/M source code programs are stored. This ability to use CP/M source code programs is unique to the Morrow system and is not a normal UNIX feature. *dev* is an important file because it contains the parameters for all our terminal ports and printer and modem ports. By merely defining some parameters in the *dev* files you can add different terminals to each port without

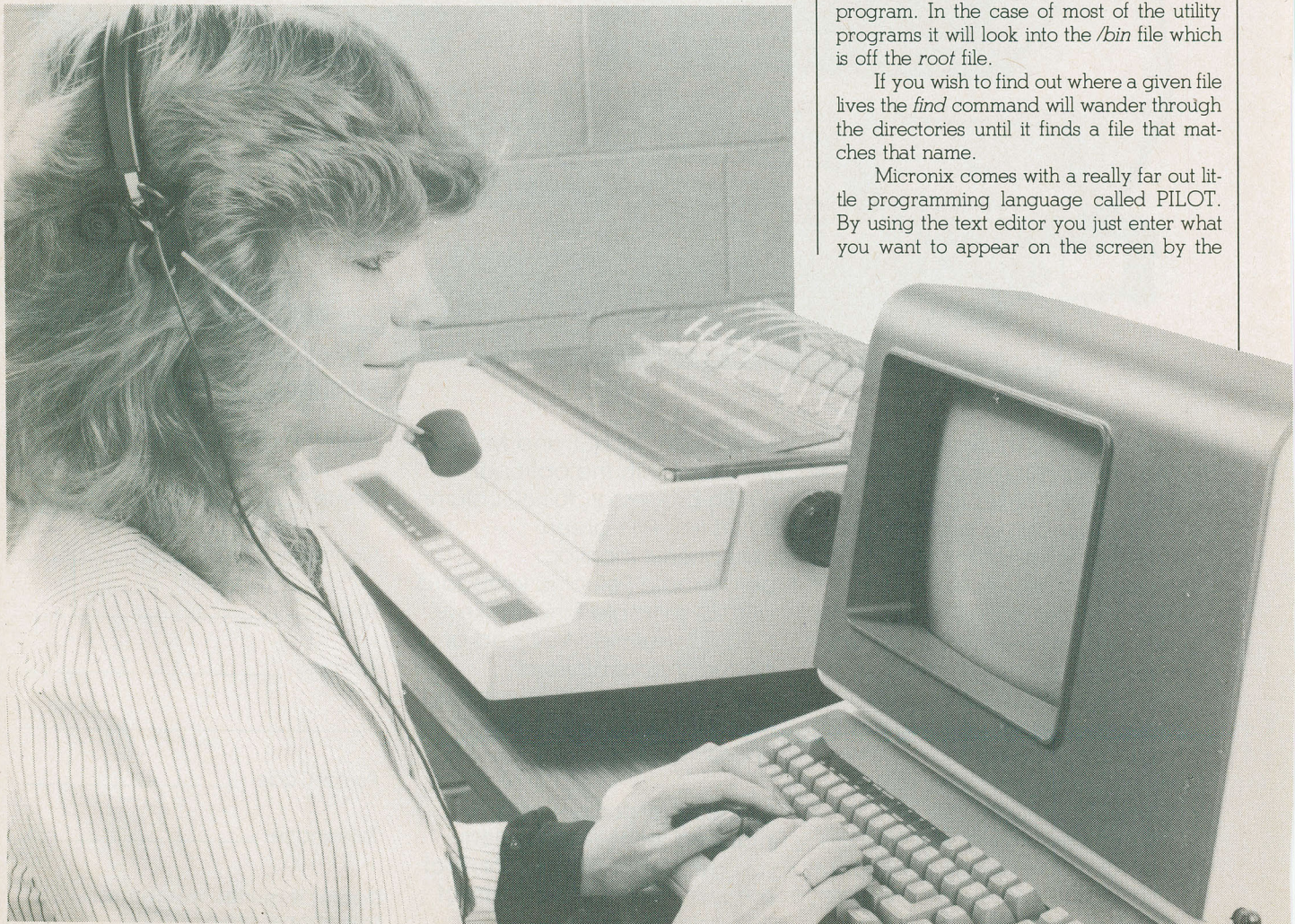
having to reinstall your program software.

There is one listing called *a*. This is the file that contains the pathway to all the end users on the system. Like many of the other files we have just discussed, it is actually another directory. As you can see a directory is just a file with some text in it that contains the names of the files within that directory. On our system *a* contains the names of all the user accounts that are allowed access to our system. It is nothing more than another directory that leads down the path to the end user.

UNIX has almost no resident commands, unlike CP/M which has the DIR, REN, TYPE and others in memory. Instead UNIX stores most of its utility programs in the */bin* or */etc* files that we looked at before. When you type in a file name by itself, UNIX assumes that it is the name of a program. If the program is not in the directory that you are in, then it charges back up the pathway looking in each directory until it finds the program. In the case of most of the utility programs it will look into the */bin* file which is off the *root* file.

If you wish to find out where a given file lives the *find* command will wander through the directories until it finds a file that matches that name.

Micronix comes with a really far out little programming language called PILOT. By using the text editor you just enter what you want to appear on the screen by the



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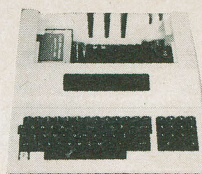
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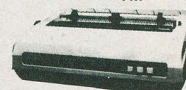
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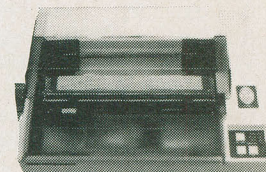
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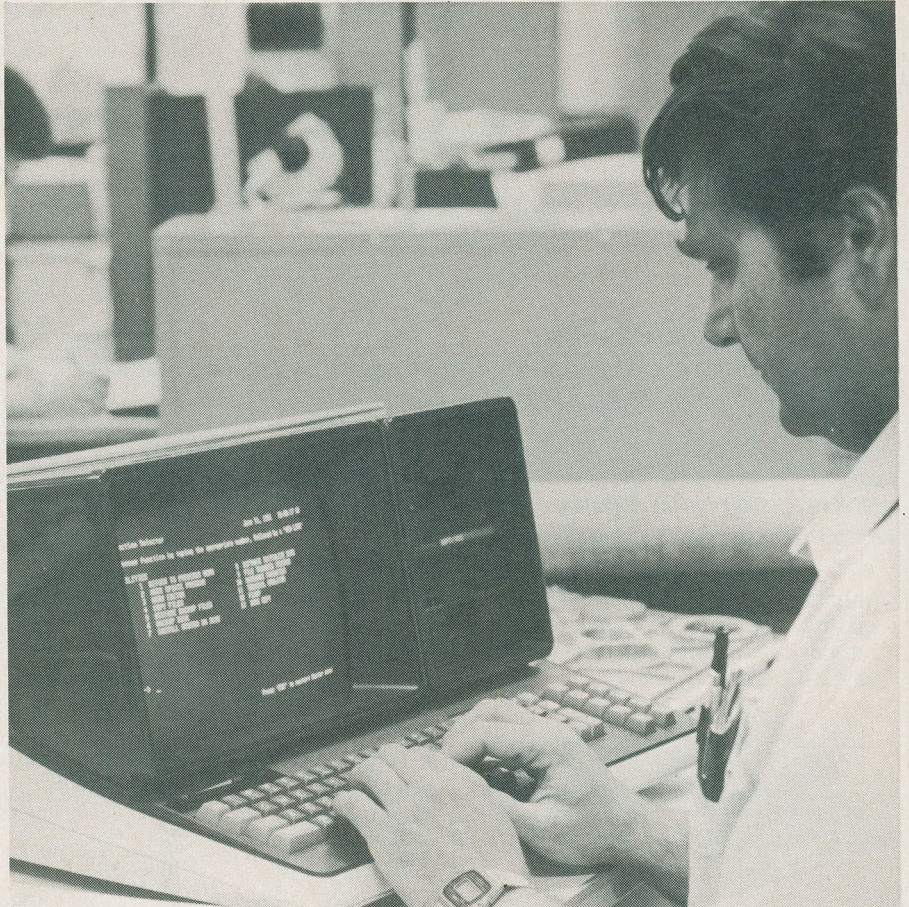
way of a menu or what have you. There are only about a dozen commands in this version of PILOT and they are all set up for this kind of thing. This allows you to easily create a menu of options for users who have no desire to learn all about the fine operating system you are providing but just need access to a few programs and files.

One of the biggest differences in using Micronix rather than mainframe Unix is a program on called *upm*. This is the utility that lets the system run almost all CP/M based programs. Because CP/M programs often want to know what drive you have assigned their files to, *upm* lets you assign a file directory as a logical drive for CP/M. For example, if you have Wordstar in the */cpm* directory, Wordstar will want to know what disk drive to put the text files on. In essence you tell *upm* that you have assigned the directory */a/garry/letters* as logical drive B for CP/M. Then you would tell Wordstar to log onto drive B.

Of course the *upm* in Micronix lets you use the CP/M files in a multi-tasking, multi-user environment so that several people can use the same programs at the same time on the same files.

Among the most powerful features of Unix are *pipes*, *filters* and the ability for program direction. A *pipe* is much like it sounds, a pipe down which your program data or files may flow. When you set up a pipeline, all the programs run together at the same time. In this manner you can group together individual small programs in a given order so that the end result would be like having one big program that does the same thing.

Each individual program along the pipe is called a *filter*. For example you might tell the pipe to take the output from your terminal which is using the *edit* program, filter that through the *words* program to count the number of words and then send the file to the *lpr* program which will put it in line to be printed out at the printer. This will then



take your input, count the number of words as you are typing, send it out to the printer and then tell you how many words you typed when you are finished.

Real Time

A practical application for all of this is probably in order. The one we're going to look at concerns the use of a multi user system to keep track of the customers and tapes in a video store.

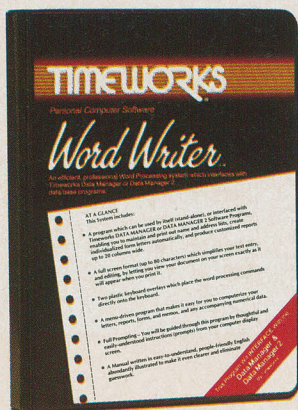
Let us start with you logging in as the system operator. Sitting yourself down at any terminal... and that could be at the end of a modem... you will be greeted with a question, such as "Name:", to which you might reply "theboss". The system would then ask you for your password, to which you would reply accordingly.

Now you will have to create a shell for the users by running a program called *account*. This program lets you set up the new users on the system and lets you define their access to different files and programs as well as setting up their paths and directories. We shall call the account for this purpose "videostaff1". The account program automatically sets things up so that everyone who logs in as "videostaff1" will be given unlimited access. This is uncool as the boss may decide to store his payroll on this system some day and may not want the staff to write their own pay cheques.

To keep the staff's access out of these and other places that they don't belong we must alter their shell so that their access is limited to only the movie database. This

```
ls: Command not found.
ls -la
d---rwxr-xr-x  2 garry      80 Nov 12 14:12 .
d---rwxr-xr-x 15 sysop     256 Dec 10  1:24 ..
-rw-rw-rw-    1 sysop      10 Nov  6 17:56 .sh
-rw-----    1 garry     366 Nov 27 16:01 mbox
-rw-rw-rw-    1 sysop     556 Nov  6 20:15 note
```


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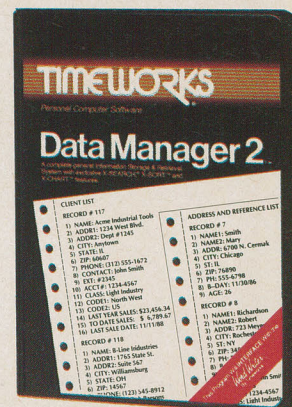
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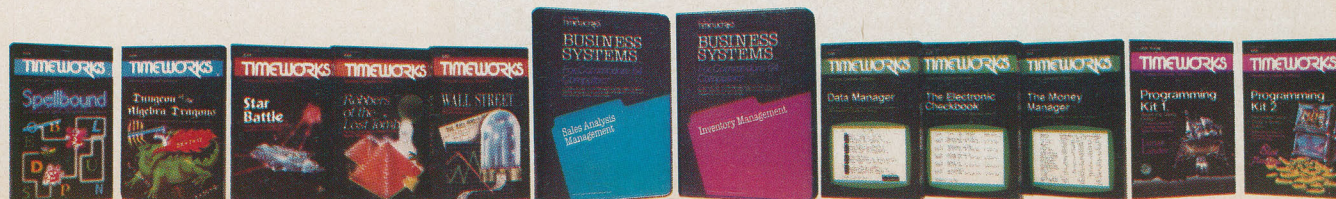
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Multi-User Systems

done, every time the staff logs in at any terminal in the system they will automatically be presented with the database program running the movie recording application. The only thing they will have to learn now is how to move around within this program.

Now we want to set up a shell for the store manager to use. Obviously he or she will want to be able to do more than just look up the availability of a movie. We start as we did before with the *account* utility. However now we set up the shell so that it has general access to the files on the system. What we do is write a simple program in PILOT to set up the shell so that this program is automatically run when the manager logs in to the system. We'll also tell the shell to dump the manager out of the system if an attempt is made to exit the pilot program we have stored in this shell. This means that the manager can only have access to the files listed on the menu we have created in PILOT.

Finally, we must set up an owner's account which will let the head cheese do whatever the heck he likes, as he is the one paying for all this. This is also necessary so that the owner can take care of making the daily backups of the data just in case the hard disk crashes some day.

This is a really modest example of what can easily be done by a system programmer with any UNIX like system. We could have just as easily set up a shell for each individual staff person with their own password. Each of these shells would be identical and all would access the same database. The difference is we could have added things like electronic mail or the logging in of their own hours worked. This

```

: Command not found.
pwd
a garry
cd a
ls
bernie      jay      midcan      ralph      sysop
garry      johnk
help      microb
% cd ;ls
a      dev      finstall      lost+found      usr
bin      etc      fsck.victims      micronix      xall
core      f      include      printfile
cpm      file177      lib      tmp
%

```

would let them send each other mail or for that matter let the boss leave them little notes and reminders in the system.

Logging On

Let us now look at what the average employee sees when he or she logs into the system. Just as in the case of the boss, they are greeted with the request for their names, to which they would respond with the name of their shell, *videostaff1* in this case. Then they are asked for the password. Soon the system responds with the "message of the day" which in this case reminds them that today is "rent one movie and get the second one for half price" day.

Now our employee is in the database that we have set up to keep track of the availability of movies that they have to rent. Someone comes in and asks for movie number 465 on their list. The staff person types in 465 and sees that the movie is "Raiders of the Lost Ark" in VHS format and

that it is on loan to member number 1354, due back tomorrow by five PM.

If both terminals had tried to access the same movie at the same time the second person would get a message saying "record being accessed, please wait". This is done so that both terminals don't try to reserve the same movie at the same time.

Endless Power

Before we put a wrap on it, let me say that we have only scratched the surface of what you can do with this type of a system. For under fifteen thousand dollars one can get, for example, the Morrow Decision 1 system we've been using as an example with two hundred and fifty six K of ram, sixteen megabytes of hard disk space, a back up floppy drive, two terminals and modems... for use if the terminals connect to the main system over the phone lines... an eight inch disk drive, the Micronix operating system complete with over one hundred utility programs, a whole bunch of CP/M software, Whitesmith's C and Pascal compilers and the Optimum database package.

Multi user systems are not the solution to buying more computers to do more tasks. However, if your application calls for multiple users accessing common data, a multi terminal micro such as the Morrow can be a very cost effective solution. It is extremely flexible, relatively simple to set up... don't let all this lower case discourage you... and can take advantage of a vast library of software.

The author would like to thank his brother, Jay Frankel and his associate Ralph Seidel who together are known as Eight Bit Byte Associates for allowing him to use the Morrow system this article is based on.

[The Morrow Decision 1 multi-user system is distributed by Micro Bazaar, 23 Westmore Drive, Unit 5, Rexdale, Ontario M9V 3Y7 1-416-745-4740.]

CNI

```

cd cni:ls
account      dc      icheck      ncheck      stty
a:at         dcheck    kill        netact      su
as           ddt       last        netcp       sum
as:scots     df         lib         netdaemon   tail
a:           diablo    link        netmail     td
a:t          diff      ln          obj         tee
a:           down      login       od          touch
a:           du        lord        owner       tree
a:ars        echo      lpai        passwd      tty
a:mod        edit      lpr         paste       type
a:lean       far       ls          pilot       umount
a:mp         fdj       mail        print       unique
a:comm       field     make        ps          update
a:           file      man         ptc         upm
a:01         find      mkdir       pwd         wall
a:02         form      mkfs        recon       who
a:00         fsck      mknod       rm          words
a:tree       grep      more        rp          write
a:create     hd        mount       sh
a:           help     msgs        sleep
a:           hex      mv          sort
a:                           split

```


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Conti Computer Systems
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Radio Shack Computer Dept.
450 Lansdown, Thompson Park Shopping Centre, Kamloops, B.C., V2C 1Y3

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Dynamic Computer Centre
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Micro West Data Systems Ltd. ETI/CN
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(604)860-4844
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Net Software
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(604) 534-1233
Manufactures of Software for Education and Recreation.

Vulcan Computer Systems
20571 Fraser Hwy., Langley, B.C., V3A 4G4

Maple Ridge

Maple Ridge Video
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Sidney Compupower
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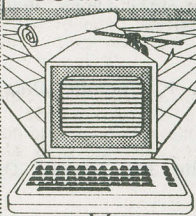
RTC

(416) 884-4165

10610 BAYVIEW (Bayview Plaza)

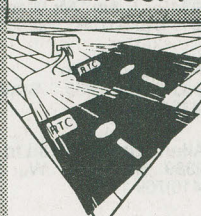
RICHMOND HILL, ONTARIO, CANADA L4C 3N8

SCRIPT 64



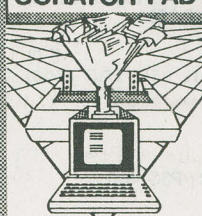
\$129.

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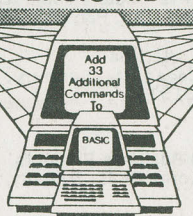
\$39.95

SCRATCH PAD



\$49.95

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Rockwood

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143 Dennis St., Rockwood, Ont. N0B 2K0 (519) 856-9566

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Selling apple, Columbia, computers with interfacing and software for scientific and industrial laboratory applications. Other companies represented - Tecmar, Robographics, Trivector, International, Rana, Interactive Microware.

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Computerland

1362 Lambton Rd. Mall, Sarnia, Ont. N7S 5A1 (519) 542-5568

Comp-Can

1477 Hunt St., Sarnia, Ont. N7S 3M8

Keelan's Audio & Video

460 North Christina, Sarnia, Ont., N7T 5W4

Radio Shack Computer Dept.

1125 London Rd., Sentry Plaza, Sarnia, Ontario, N7S 1P3

Radio Shack Computer Dept.

150 N. Christina St., Sarnia, Ont. N7T 5T9 (519) 337-4360

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1407 London Road at Intl. Plaza, Sarnia, Ont. N7S 1P6 (519) 542-1133

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Zenith, Epson, Atari, Teo, Coleco, Adam. Full service dept., hardware and software support. Specialize in business systems. Software, books, and computer accessories.

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Computerforce - 525224 Ont. Ltd.

ETI
424 Plm St., Sault Ste. Marie, Ont. P6B 2V1 (705) 942-5770

MO

IBM, Xerox, Dec, Franklin

MD Data Systems

ETI/CN
485 Queen St., Sault Ste. Marie, Ont. P6A 1Z9 (705) 949-6622

Apple, Commodore, IBM, Dec Rainbow, Microm. Custom software - Sales, service and support for above products.

Radio Shack Computer Dept.

293 Bay St., Station Mall, Sault Ste. Marie, Ont., P6A 1X3

Sault Office Machine

122 Poplar Ave., Sault Ste. Marie, Ont., P6B 2W9

Scarborough

BCC Business Computer Centre Inc.

209 Ellesmere Rd., (at Ellesmere & Warden), Scarborough M1R 4E2 (416) 292-7672

IBM PC Corona PC and compatibles, fixed and removable hard disk drives, full and half height floppy disk drives, multi-function memory expansion boards, letter quality and dot-matrix printers, complete line of business software, computer accessories and supplies, service contracts available.

Beacon Software Inc.

705 Progress Ave., Unit 17, Scarborough, Ont. M1R 2X8 (416) 431-3200

Computerland

3761 Victoria Park Ave., Unit 5, Scarborough, Ont., M1W 3S2

Computer Innovations

Scarborough Town Centre, 300 Borough Rd., Scarborough, Ont., M1P 4P5 (416) 296-0023
IBM PC & XT, Apple //e, //i, DEC Professional, Lisa.

Computer Innovations Corp.

3761 Victoria Park Ave., Unit 2, Scarborough, Ont., M1W 3S2 (416) 497-7522
IBM PC & XT, DEC Professional, Apple //e, Apple //i, Lisa.

Computer Junction

3330 Pharmacy Ave., Scarborough, Ont.

Computer Way

31 Progress Court, Unit 31, Scarborough, Ont. M1G 3V4 (416) 439-9804

Cycom Systems Ltd.

#1-3500 Pharmacy Ave., Scarborough, Ont. M1W 2T6

Eaton's Business Centres

ETI

Scarborough Town Centre, 300 Borough Drive, Scarborough, Ont. M1P 4P6 (416) 296-5211

Ext. 372

Computers from IBM, Apple, Hyperion and Zenith. Selections of business, educational, and entertainment software. Customer training facilities and service areas.

Interactive Micro Systems

34 Hopecrest Cres., Scarborough, Ont. M1K 2K4 (416) 261-8411

Light Computers Centre

ETI/CN
300 Borough Drive, Scarborough, Ont. M1P 4P5 (416) 296-2406

Authorized dealer for Apple, Gutenberg, Texas Instruments, P.C., Coleco, Adam.

MEC Micro Elect Corp.

325 Milner Ave., Ste. 101, Scarborough, Ont. M1B 3C6

Micro Canada

4271 Sheppard Avenue E., Scarborough, Ont. M1S 4G4 (416) 291-2995

MO

Columbia, Kaypro, Atari computers. Peripheral cards for IBM, Apple. Mannesmann-Tally, Diablo, Epson printers. Anchor, Hayes' modems. Printer buffers, monitors. Books, diskettes, furniture. Service, training.

MicroCTR of Toronto

56 Marblemount Cr., Scarborough, Ont., M5H 2H5

Microtrend Business Systems Ltd.

10161 Sheppard Ave. E., Scarborough, Ont. M1B 1G1 (416) 281-1129

Micro Mart

4651 Sheppard Ave. E., Ste. 203, Scarborough, Ont. M1S 3V4 (416) 293-9444

Nigana Computer Syst.

136 Shorting Rd., Scarborough, Ont. M1S 3S6

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2910 Warden Avenue, Scarborough, Ont. M1T 1V6 (416) 491-3139

SCI-COM

2300 Lawrence Ave. East, Scarborough, Ont. M1P 2R2

Titan Computers

15 Crockford Blvd., Unit 1, Scarborough, Ont. M1L 4J9 (416) 759-8808
Franklin Ace

Total Office Systems

1050 McNicoll Ave., Unit 14, Scarborough, Ont. M1W 2L8 (416) 493-3575

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Sharp PC5000 Portable Lightweight Computer - weighing 9.5 lbs. the truly portable 16-bit computer has more computing power than a desktop designed for the travelling business professional. The machine is equipped with 128K RAM memory expandable to 256K and a removable bubble memory cartridge of 128K, a storage substitute for disk drives. To enhance portability, Sharp incorporated a unique 8 line X 80 character flat LCD with graphic capabilities which folds over the keyboard when not in use. Optional peripherals avail-

Directory of Computer Stores

able are 10 key modem with auto dialer and serves as a 10 key pad (and calculator) providing communication and data transfer, a thermal printer 37CPS correspondence quality fits internally into system and external dual disk drives. Initial software; word processing, spread sheet, communications, database and executive planner.

Versacom Systems Inc.
126 Shorting Road, Scarborough, Ont. M1S 3S6
(416)292-2012

Simcoe

Computer World
Box 414, Simcoe, Ont. N3Y 4L2

Micro Mini Mart
16 Colborne St. S., Simcoe, Ont., N3Y 4H1

Smiths Falls

J-R Business Equip.
12 Russell St. E., Smiths Falls, Ont. K7A 1E8

Stouffville

Zetetic Data Systems
RR2 Stouffville, Ont., L0H 1L0

Stratford

Chipon Computers and Electronics
137 Albert St., Stratford, Ont. N5A 3K5 (519) 273-1412
Columbia PC, personal computers such as, Zeus 2001, Super 400, Apple Compatible and Diamond. Software for Apple, IBM, Commodore, TRS80 and Atari for business and entertainment. All peripherals for Apple, cables, printers, a large variety of books and more.

St. Catharines

Computerland
318 Ontario St. St. Catharines, Ont. L2R 5L8 (416) 688-1187
Products 200 Vendors include: Microcomputers, Peripherals, Software and Accessories. IBM, DEC, Apple Bytec Hyperion and Compaq Computers; Epson, C-Jtoh and Okidata Printers; IBM, Amdek, Electrohome and Princeton Monitors; and Lotus Visicorp, Helping Hands, Spinnaker and Mattel Software.

Drummondville Computer Systems
14 Ontario St., St. Catharines, Ont., L2R 7M3 (416)684-7766
Zenith business systems and software, full service centre (Zenith).

International Computer
117 St. Paul St., St. Catharines, Ont., L2R 3M4

Megabyte Business Systems Ltd.
96 Niagara St., St. Catharines, Ont. L2R 4L4 (416)684-4366
Business and home computers. Dealer for Commodore, Ohio Scientific. Sales and shop or on site service.

Radio Shack Computer Centre
290 Glendale Ave., St. Catharine, Ont. L2T 2L3 (416) 227-2063

Radio Shack Computer Dept.
333 Ontario St., St. Catharines, Ont. L2R 5L3

Rainbow Computer Systems
67 Queen St., St. Catharines, Ont. L2R 5G9 (416)682-4334
Niagara region dealers for Kaypro and Columbia micro computers.

Xerox
63 Church St., St. Catharines, Ont., L2R 3C4

Sudbury

A & B Office Equipment
2148 LaSalle Blvd., Sudbury, Ont., P3A 2A7

Computerland
Unit #19 Cedar Point Plaza, 1984 Regent St. S. Sudbury, Ont. P3E 5S1 (705) 522-3663

Computerline ETI
74 Cedar St., Sudbury, Ont. P3E 1A5 (705) 674-3151
MO

MPM Business Products
653 Lorne St. S., Sudbury, Ont., P3C 4R3

North Star Computer Ltd. ETI
598 Falconbridge Road, Sudbury, Ont. P3E 4K6 (705)566-6441/673-2010
MO
System sales supplier. Products include IBM, Apple, AES, Minolta and 3M micrographics.

Radio Shack Computer Centre
1609 LaSalle Blvd., Sudbury, Ont. P3A 1Z8 (705)560-5747
CAT FREE
TRS-80 computers, peripherals and software for business and personal use. Education department provides training for software and basic.

Sonic Northern Ltd.,
298 Elm St., Sudbury, Ontario, P3B 1N6

Timmins

Dynamic Data Systyms
88 Pine St. S., Timmins, Ontario, P4N 2K2

Timmins Comp. Power
70 Balsam St. S., Timmins, Ont., P4N 2C8

Timmins Stationery
135 Third Ave., Box 1064, Timmins, Ont., P4N 7J2

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Allied Computer Centres Inc.
121 East Ave., Thunder Bay, Ont. P7B 5N1 (807)345-8031
Authorized dealer for: Apple Computers, Epson Computers & printers. Complete selection of software. Complete training facility.
Thunderbay
Radio Shack
1101 Arthur St. W., Thunder Bay, Ont. P7E 6E2 (803)577-3051

Audio Service Centre
223 Algoma St. S., Thunder Bay, Ontario, P7B 3C3

Thunder Bay
Computerland
1265 Arthur St. E., Thunder Bay, Ont., P7E 6E7 (807)623-5434
Software and hardware retailer. Software brands include: IBM, Peach Tree, BPI, Ashton-Tate, Micro-Pro, I.U.S., PBSC, etc. Hardware includes: IBM, Digital equipment, Compaq, Nelma-Data, Bytec, Epson, Centronics.

Thunder Bay
Datalogic Systems
215 Red River Road, Thunder Bay, Ontario, P7B 1A5

Toronto

Active Components ETI
14 Carlton St., Toronto, Ont. M5B 1K5 (416) 977-7692
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Complete electronic components and computer products needs. Texas Instruments, Motorola, Fairchild, General Instruments, Anadex printers, Keytronics keyboards, Star Micronics printers, Micro Professor computers, Tandon drives, AMP, Ersin Multicore Solder, Ungar, Weller, OK Industries, Vaco, Xcelite.

Advanced Micro
P.O. Box 983, Station F, Toronto, Ontario (416)762-3703

Allan Hamm Sales Ltd.
2389 Bloor St. W., Suite 300, Toronto, Ont. (416)769-1773

Arkon Electronics Ltd. ETI
409 Queen St. W., Toronto, Ont. M5V 2A%
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Apple computer sales and service, victor computers, full software inventory, manuals, books, peripherals, accessories, parts, meters, scopes, custom cables, consulting services, kits and games.

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578 Marlee Ave., Toronto, Ont., M6B 3J5 (416)781-3263
MO CAT \$1.00
Direct import and sale of computer/audio/electronic kits, parts and accessories. Servicing especially electronic hobbyists, students, teachers, technicians and engineers etc.

Backwater Software
15 Bideford Ave., Suite 303, Toronto, Ontario

Batteries Included
186 Queen St. W., Toronto, Ont., M5V 1Z1

Batteries Included
71 McCaul St. (F6), Toronto, Ont., M5T 2X1

Brack Electronics
129 Jarvis St., Toronto, Ontario, M5C 2H6

Compucentre
Box 1052, 218 Yonge St., Eaton Centre, Toronto, Ont., M5B 2H6

Compucentre
2nd Floor, Ste. 207, Eaton Ctr. Galleria, Toronto, Ont. M5B 2H1 (416)596-1300

Compucentre CN
220 Yonge St., Suite 202, Toronto, Ont. M5B 2H1 (416)596-1300
IBM, Apple, Hewlett Packard, Texas Instrument, Hyperion, all types of software as well as service.

Compucentre
20 Bloor St. E., Concourse Level, Toronto, M4W 3G7 (416)961-5978
MO
Electronic calculators, home computers, eg. Coleco, Adams, Commodore 64, Timex/Sinclair 1000, also software and peripherals.

Computerland
85 Richmond St. W., Toronto, Ont. M5H 2C9 (416)947-1330
IBM personal computers; PC, PC jr., PC-XT Apple IIe, Macintosh, Hyperion, Compaq, Nelma Persona, Dec Rainbow 100 and 100 plus.

Computerland
1254 Bay St., Toronto, Ont., M5R 2B1 (416)927-8445
CAT FREE
IBM, Compaq, DEC digital, Hyperion, Apple, Nelma.

Computerland
2180 Yonge St., Toronto, Ont. M4S 2B9 (416) 485-6700

Computer Book & Supply
253 Eglinton Ave. West, Toronto, Ont. M4R 1B1 (416)489-3625

Computer Innovations ETI
Corporate Offices: 401 Bay St., Suite 2115, Toronto, Ont. M5H 2Y4 (416)864-0808
Retailer of microcomputer products for business and professional applications. Products - IBM PC & PC-XT, Apple, Texas Instruments and Digital personal computers. Software for business, education and leisure, peripherals and accessories.

Computer Generation
1722 Avenue Rd., Toronto, Ontario M5M 3Y6

Computer Innovations
4800 Yonge St., Toronto, Ont., M2N 5M7

Computer Innovations CN
44 Bloor Street East, Toronto, Ont. M4W 3H7

Computer Innovations CN
176 Yonge Street, Toronto, Ont. M5C 3L7

Computer Innovations CN
Hwy 401 & Dufferin, Toronto, Ont. M6A 2T9

Comspec Systems
750 Oakdale Rd., Unit 57, Toronto, Ont. M3N 2Z4

C.P.&A. Ltd.
1320 Yonge St. Unit 300, Toronto, Ont. M4T 1X4 (416)925-9950

Compu-Group
2255 Sheppard Ave. E., Unit 136, Toronto, Ont. M2J 4Y1 (416)499-2900

Computer Junction
878 Yonge St., Toronto, Ont. M4W 2J1

Computer Mat Inc.
37 Mutual St., Toronto, Ont. M5B 2A7 (416)362-2783

Computer Shack
567 King West, Toronto, Ont. M5V 1M1 (416)598-1777

Computer Workshop
465 King Street East, Unit 9, Toronto, Ont. M5A 1L6 (416)366-6192

Data Terminal Mart
120 Adelaide St. W., Richmond/Adelaide Centre, Toronto, Ont., M5H 1T1 (416)364-4480
Computer retailer selling terminals and microcomputers from Digital, Texas Instruments, Dume, Kaypro, and Anderson, Jacobson, as well as printers, modems and a full range of application software.

Delphi Systems Group Inc.
17 Stephanie St., Toronto, Ont. M5T 1B1 (416)593-7707

Delphi Systems Group
71 McCaul St., Toronto, Ont., M5T 2X1

Dimensional Business Systems
199 Bay St., 4th Floor, Toronto, Ont., M5J 1L4

Eaton's Business Centres ETI
290 Yonge St., Toronto, Ont. M5B 1C8 (416) 591-2323
Computers from IBM, Apple, Hyperion and Zenith. Selections of business, educational, and entertainment software. Customer training facilities and service areas.

Eaton's Business Centre ETI
Yorkdale Shopping Centre, 3401 Dufferin St. Toronto, Ont. M6A 2T9 (416)789-6406. ETI

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Ecosea Technologies Corp.
465 King St. E. Unit 13, Toronto, Ont. M5A 1L6 (416)366-1000

Efston Science Inc. ETI/CN
3350 Dufferin St., Toronto, Ont. M6A 3A4 (416)787-4581
MO CAT \$2.00
Source for technology and scientific products related to computers research, science projects, consumer electronics, speciality tools, optics, microscopes, telescopes.

Electronic Playworld
1728 Avenue Rd., Toronto, Ont. M5M 3Y6

Exceltronix ETI
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Complete line of IC's, Discrete components, Multiflex S-100 computer systems, Apple, IBM and Commodore peripherals, software and books and computerized versa-Digital display signs.

Fastron
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First Byte
111 Queen St. E., Unit 302, Toronto, Ont. M5C 1S2 (416)366-4045

Gladstone Electronics
1736 Avenue Road, Ste. 3, Toronto, Ont. M5M 3Y7

Heathkit Electronic & Computer Centre ETI
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House of Computers
368 Eglinton Ave. West, Toronto, Ont. M5N 1A2 (416)482-4336
MO
Commodore Computer dealer supplying the professional, institutional, business and personal marketplace. Peripherals and accessories from a wide range of third party suppliers.

IBM Product Centre
Royal Bank Plaza, 200 Bay St., Toronto, Ont., M5J 2J2

Iris Computer
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MO CAT FREE
IBM PC/XT compatible bare motherboards, kits and completely assembled units. 128K Apple II and compatible kits or assembled systems.

J.L.S. Computers Inc.
67 Mowat Ave., Ste. 343, Toronto, Ont. M6K 3E3 (416)530-4500

Light Computers Centres
1 Yorkdale Rd., Yorkdale Place, Toronto, Ont. M6A 3A1 (416)781-9151

Lincoln Computer ETI/CN
621 Gerrard St., E.(Rear) Toronto, Ont. M4M 1Y2

Magadata Information Systems Inc. ETI/CN
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Retailer of Apple and Wang microcomputers and Corvus hard disk drives. Specialists in local area networks. Hundreds of software packages.

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1240 Bay St., Suite 802, Toronto, Ont., M5R 2A7

M & W Computer Store
407 Queen St. W., Toronto, Ont., M5V 2A5

Micronic Computer Centres Ltd.
1710 Avenue Rd., Toronto, Ontario, M5M 3Y6

Microage Computer Stores
2632 Yonge St., Toronto, Ont. M4P 2J5 (416) 487-5551
MO
Products carried: IBM, Apple, Digital, Altos computers, Epson printers, C-1TOH printers.

Micronic Computer Centre
1 First Canadian Place, Station A, Concourse Level, Box 193, Toronto, Ont., M5X 1A6

Micron Dist.
409 Queen West, Toronto, Ont. M5V 2A5
Auby Mandell Software & Books.

Microcomputech Electronics Ltd. ETI/CN
535 Queen St. West, Toronto, Ont. M5V 2B4 (416)864-0332
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Deal in Apple and IBM compatible products. Carry Hitachi, Gemini, YJE, Verbatim, Tiger and other peripherals. Distributor for Multitech, Copam and ATI products.

Micro House
72 Steeles Ave. W. Suite 208, Toronto, Ont. L4J 1A1 (416) 889-2677
MO
Sales of electronic boards and accessories disks, micro computer systems and peripherals.

Micro Marketing Can.
169 Inglewood Dr., Toronto, Ont. M4T 1H8
Manufacturers Rep. for Computer Larry Ungermano Software.

Navacel Enterprises Limited
365 Bloor St. E., Suite 1208, Toronto, Ont. M4W 3L4 (416) 922-4910
Complete business and computer consultants. Providing 'Total Service' in systems, hardware and software education, resource and business planning. Special markets include: manufacturing, education, database.

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Wang, Spectrix, and IBM micro & mini computers. Complete accounting and word processing software and services.

On Line Computer
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Directory of Computer Stores

Paule Computer
400-120 Eglinton Ave. E., Toronto, Ont.
(416)482-2274

P.C. Express ETI/CN
35 Queen St. W., Toronto, Ont. M5V 2A4

Perfect Electronics ETI/CN
315 Queen St. West, No. 1, Toronto, Ont. M5V 2A4

Personal Computer Institute
70 Yorkville Ave., Toronto, Ont. M5R 1B9
(416)964-0724
MO

Authorized IBM, Apple, Corona, Molecular dealer. Education including specialized and custom designed courses.

Professional Comp.
111 Ava Rd., Toronto, Ont., M6C 1W2

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329 Bay St., Toronto, Ont. M5H 2R2 (416)365-7207
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Exclusive TRS-80 line of computers, software and peripherals including models 4, 12, 16B, 100 and the new MS-DOS Tandy 2000.

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(416)922-0990
MO
IBM PC and XT and Franklin computer hardware, software, peripherals.

Remenyi House of Music
210 Bloor St. W., Toronto, Ont. M5S 1T8
(416)961-3111

Robert Johnson Office Equip. Ltd. ETI/CN
273 Queen St. West, Toronto, Ont. M5V 1Z9
(416)598-2345-6-7
MO

Scicom CPU Corp.
1 Dundas St. W., Eaton Centre, Toronto, Ont., M5G 1Z3

Semitronics
591 Gerrard E. #A8, Toronto, Ont., M4M 1Y2

SES Computing Inc.
366 Adelaide St. E., Toronto, Ont. M5A 3X9
(416)366-4242

Simpsons Computer Innovations
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Softrack ETI/CN
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279 College St., Toronto, Ont. M5T 1S2 (416) 927-1921
Apple Computers, Seequa Chameleon (IBM portable compatible), Coleco Adam home computer, Pied Piper CP/M portable, Microsoft, Micropro, Lotus 1-2-3, Sorcim, Wizard, Star Gemini, Epson, Quentlin, Amdek, etc.

Systime Computer Services, Box 6961, Station A, Toronto, Ont., M5W 1X7

TAF Computer Systems
2828 Dufferin St., Toronto, Ont., M6B 3S3

TAF Computer Systems Ltd.
25 Sable St., Toronto, Ont. M6M 3K8 (416) 245-4916
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North Star microcomputers (ADVANTAGE and HORIZON), associated peripherals, software packages and supplies.

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The T. Eaton Company
290 Yonge St., Toronto, Ontario

Xerox
110 Eglinton Ave. E., Toronto, Ontario, M4P 2Y1

Xerox
335 Bay St., Toronto, Ont., M5H 2R3



of Hamilton inc.

13 Bold Street

Hamilton, Ontario

L8P 1T3 Canada

527-8733

Uxbridge

Uxbridge Electronics
Box 384, 75 Brock St. N., Uxbridge, Ont., L0C 1K0

Vanier

Radio Shack
150 Montreal Rd., Les Galeries de Vanier, Vanier, Ont., K1L 8N2 (613)748-1462
Radio Shack TRS-80 Models II, III, 16 and colour computers. Hardware and software plus related peripheral equipment.

Waterloo

Abacus Computers
180 King St. S., Waterloo, Ontario, N2J 1P8

Computerland
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Compulper Software Inc.
500-22 King St. S. Waterloo, Ont. W2V 1N8 (519)746-1880
MO
Dealer for: Morrow Micro computers, Kaypro II, Micro computers, Columbia micro computers. Software manufacturer of Life Insurance related products - package and custom work.

Digitrol Computers Inc.
440 Phillip Street, Waterloo, Ont. N2L 5R9 (519)884-4690

Computerland
380 King Street No. Waterloo, Ont. N2J 2Z3 (519) 888-6011
Products include: Microcomputers, Peripherals, Software and Accessories. IBM, DEC, Apple Bytec Hyperion and Compaq Computers; Epson, C-Jtoh and Okidata Printers; IBM, Amdek, Electrohome and Princeton Monitors; and Lotus Visicorp, Helping Hands, Spinnaker and Mattel Software.

Home Computer Centre
295 Weber St. N., Waterloo, Ont., N2J 3H8

Radio Shack Computer Dept.
550 King St. N., Conestoga Mall, Waterloo, Ont., N2L 5W6

Walkerton

Walkerton Electronic
343 Durham St. E., Walkerton, Ont., N0G 2V0

Welland

Compupro Micro Systems
81 West Main St., Welland, Ontario, L3C 4Z8

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800 Niagara St. N., Seaway Mall, Welland, Ont., (416)732-2161
Radio Shack TRS-80 Models II, III, 16 and colour computers. Hardware and software plus related peripheral equipment.

Weston

Harso Limited
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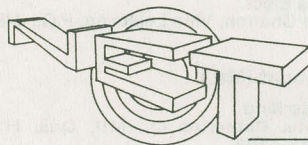
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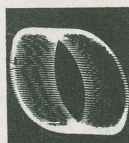
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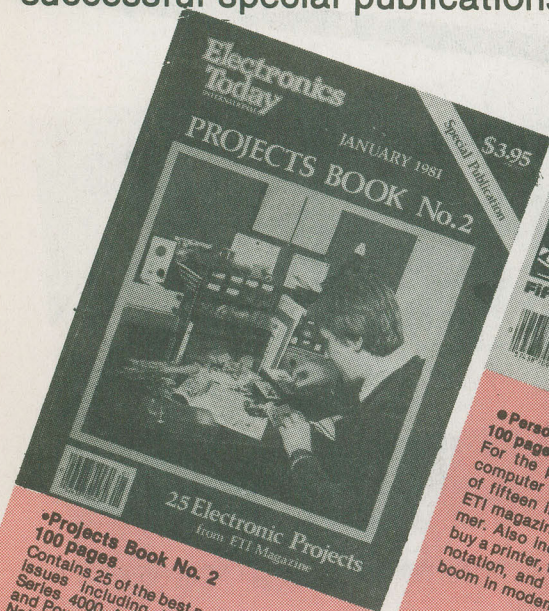
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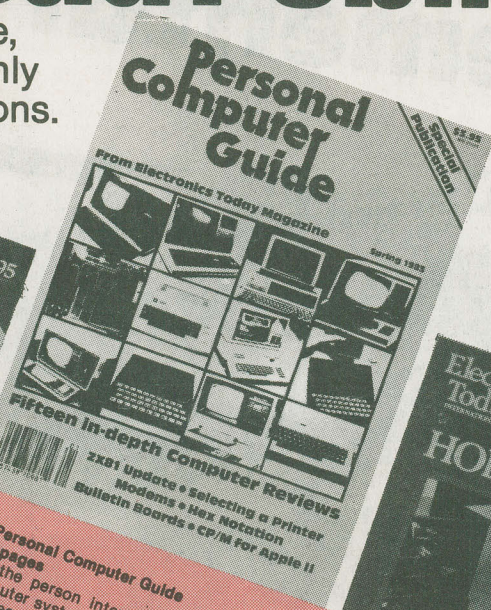
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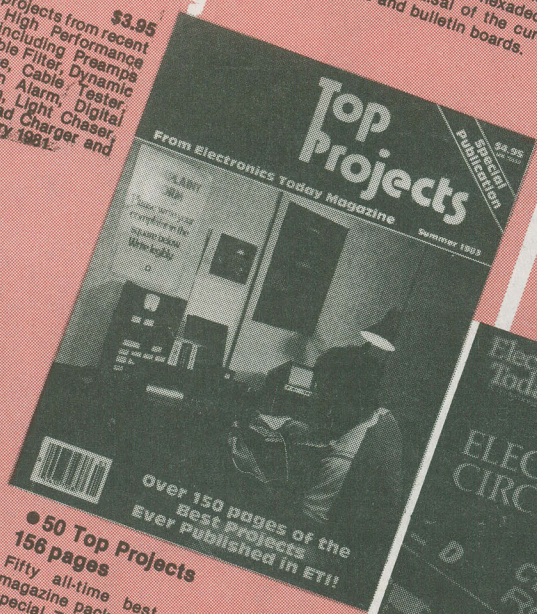
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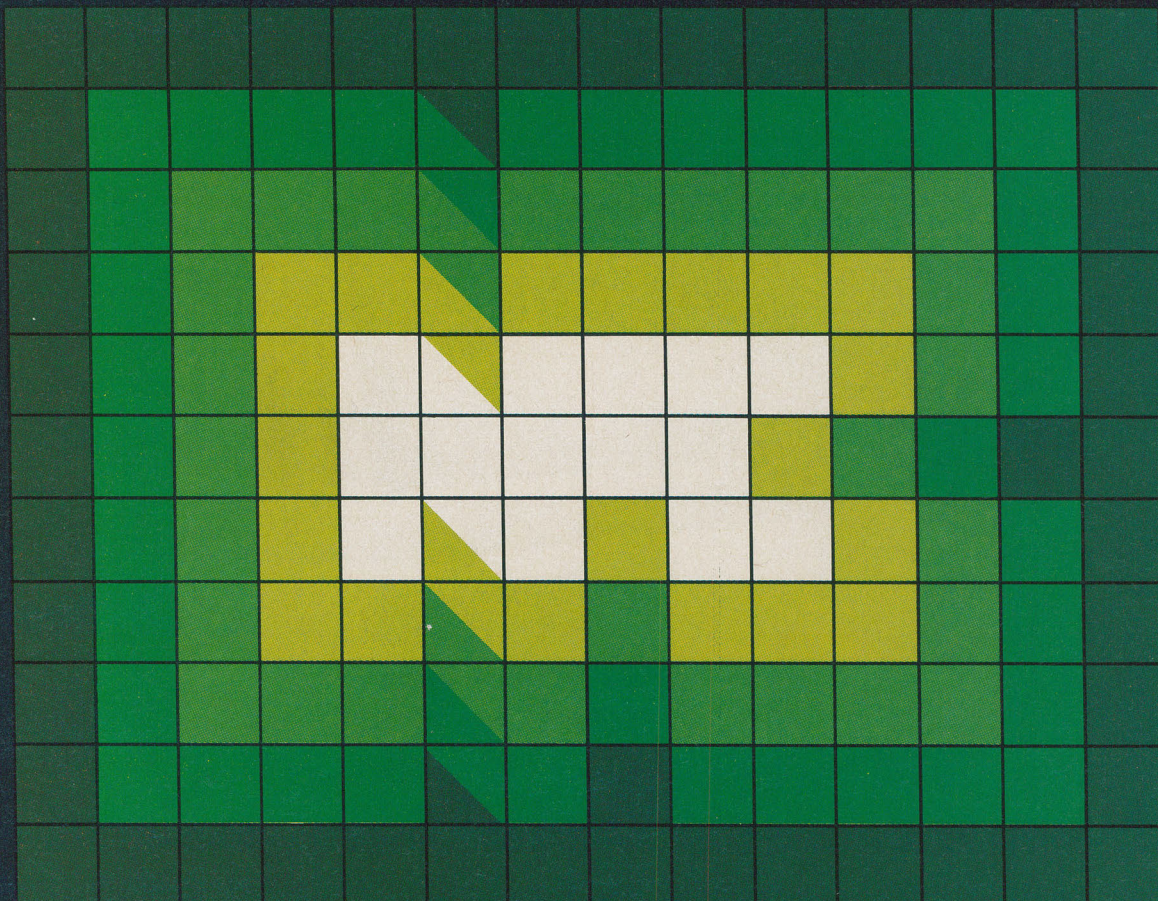
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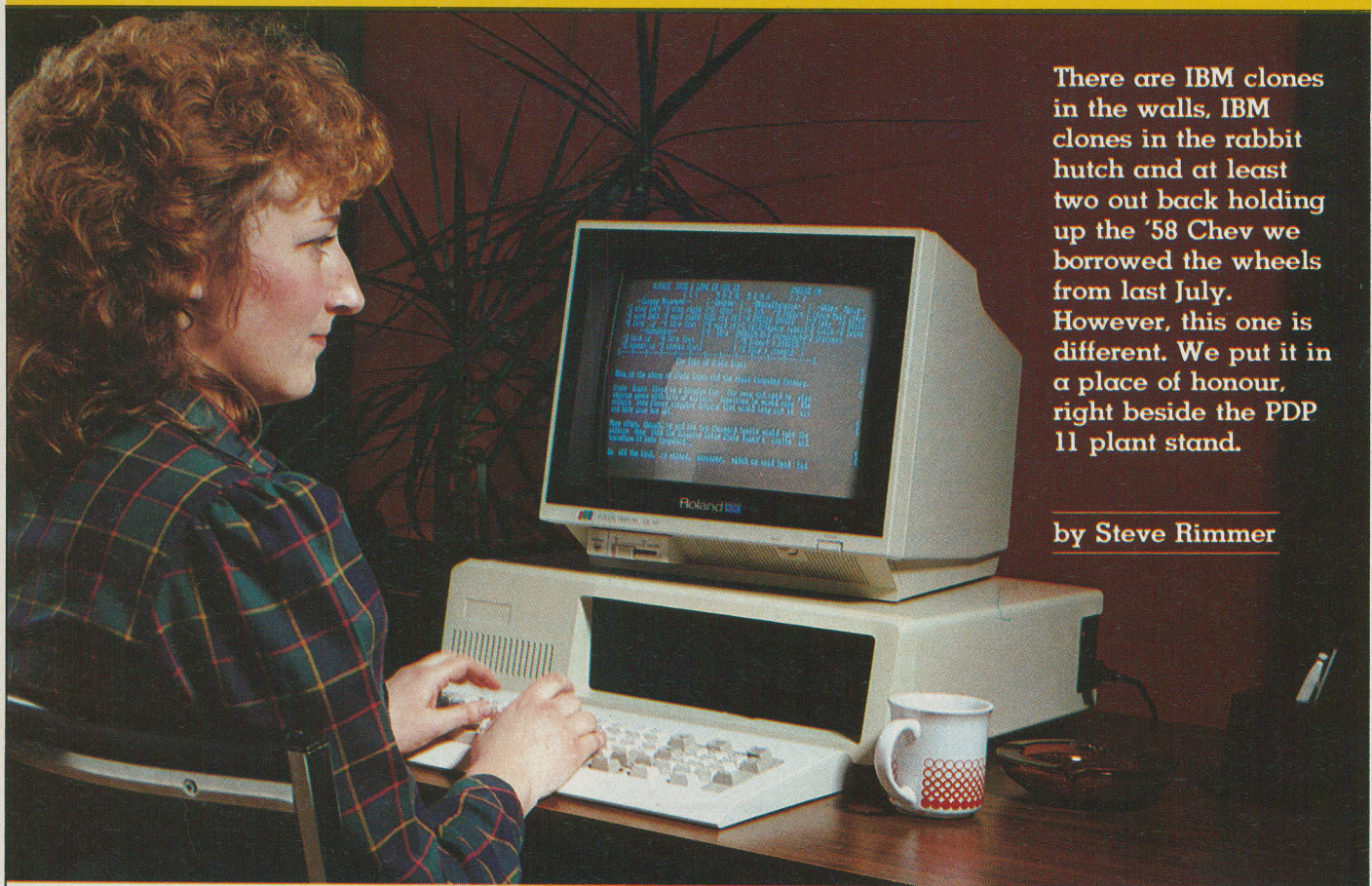
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The BEST Review



There are IBM clones in the walls, IBM clones in the rabbit hutch and at least two out back holding up the '58 Chev we borrowed the wheels from last July. However, this one is different. We put it in a place of honour, right beside the PDP 11 plant stand.

by Steve Rimmer

There have been a number of speculations concerning the meaning of the name for the Exeltronix MS DOS based system. BEST could stand for such things as Big Expensive Smart Terminal, Buy Extra Small Transistors or perhaps simply By Ex Sel Tronix, based on the real possibility that trolls can't spell. More than likely they haven't actually decided what it means yet... I'm sure that they figured out what the Commodore PET stood for long after the thing had been built, named and expunged onto the planet.

The BEST, whatever it turns out to be, is an 8088 based computer a la IBM. It's becoming uncool to call these things clones... their manufacturers like to describe them as work alikes. The system has been designed to support MS DOS and CP/M 86, making it compatible with virtually all of the software available for the PC. However, at just under two grand for the smallest configuration of the system, the BEST is a much more economical way to get access to the power of these applications packages.

You may be curious about just what you can get for two grand... especially in light of the real thing costing several times this. We certainly were... and, as such, decided to have a look at one of these beasts.

It Didn't Explode

One of the first things we noticed upon powering the BEST we got for review was that it did not, in fact, explode. This was heartening. Likewise, it did not attempt to dig itself into the floor when the disk booted nor did the monitor emit zeta rays and burn a hole in John. It was looking like an ace day.

The basic BEST comes with sixty four K of RAM stuffed into its memory card and a single dual density drive capable of holding upwards of three hundred K of information or garbage... your choice. The system is easily upgradable; you can stuff it full of up to a half megabyte of RAM if you feel like it. The front panel is designed to hold two half height drives and still leave room for a hard disk, so you can get quite a lot of storage into the machine if you find you need it.

If you're loaded and would rather spend your riches on more computer power than truckloads of CN! back issues... foo... you can, of course, buy the BEST in more powerful configurations initially.

If you trundle out of Exeltronix with a BEST under your arm you will, in fact, have the whole works pretty much within your general aura. The machine is complete and functional when acquired with the exception of

the operating system itself. This is not included in the price of the system simply because there are two of them available. One thus has the choice of popping for whichever of them suits one's particular trip... or both if you're indecisive.

In fact, both packages are relatively inexpensive and both are easily available. We'll get to their differences in a second.

Making the BEST do its stuff is pretty straightforward. You plug in the computer, plug in a monitor, plug the computer into the monitor... it gets a bit hard to read if you forget this step... zap in the system disk of your choice and juice the thing. The computer takes about forty five seconds to test its memory, throws error 131 to tell you that the cassette interface is not active and then launches into the operating system proper. In the normal course of events it asks for the time and the date to initialize its software real time clock and then rips right into a prompt.

At this point, the galaxy is your banana. There are hundreds of applications which will run nicely on the BEST, with more being developed even as the ink dries on this issue. However, let's start with the obvious stuff.

Most of the applications packages we tried on the BEST ran well with either the minimum

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Circle No. 7 on Reader Service Card

The BEST Review

sixty four K of RAM installed in the system or with the thing expanded out to larger volumes of retention. A few of the larger business packages, like Lotus 1 2 3 like to have more than the minimum allotment of RAM, but, then, if you can afford Lotus you can probably afford more chips to use it with.

Wordstar, usually a decent benchmark for business packages in comparing the speed of a computer, clipped along agreeably smartly on the BEST. The effective speed of the system's 8088 processor exceeds that of all but the liveliest Z-80 based machines, so disk accesses and search and replace things were very snappy indeed. The screen access time for all IBM compatible systems is fairly long... that of the BEST included... because of the way the system handles its communication with reality. As such, the screen tended to flicker a bit in scrolling.

This latter hassle is largely unavoidable in this type of system, and the flashing lights weren't nearly as freaky as we've seen on some systems, which threatened to provoke epileptic fits.

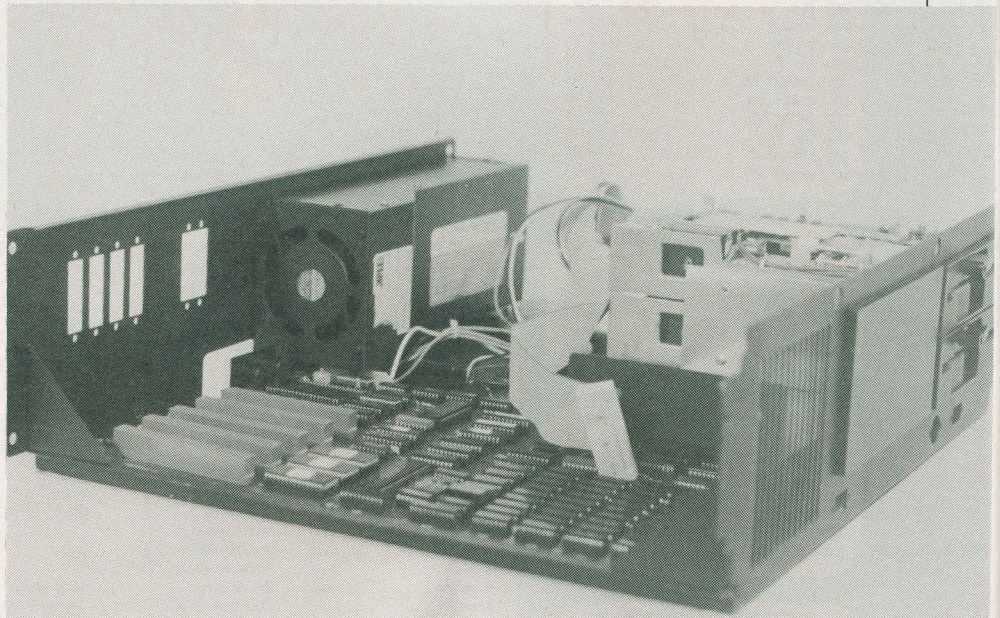
At this point, the galaxy is your banana...

The video card which we got with the BEST was actually a fairly decent piece of work. It's based, like most of these things, on the 68A45 video controller chip, but. This is, suitable for driving a monochrome monitor as well, and, when fed into a green or amber tube has resolution approaching that of a proper black and white card. There is also an RGB colour jack. This is a fairly real improvement over the cost of buying both a colour and a black and white board.

The BEST presents one with a regular twenty four line eighty column screen. The characters are kind of frilly looking, with serifs and all, in the style of the original PC. They're attractive and fairly easy to read. The video board handles half brightness characters on command, allowing applications programs to dim out portions of the text they present.

Wordstar and Supercalc looked really nice on this system. The Wordstar menus came up dimmed out, which actually makes them easier to read and less distracting when you aren't up for consulting them. The dim characters were also used for block deliniations.

The system is particularly applicable to packages which do a lot of work when they



The BEST within. The power supply is fan cooled and runs a long while without setting toasting.

run. Data base things, for example, are a short walk on the water for this sort of computer as it can access its disks quickly and its actual processing is pretty lively.

Deal Some Cards

There are actually two peripheral cards stuffed into the BEST, leaving three slots free on the motherboard to hold other mysterious devices to be hunted down and cornered by the user. The second card is ostensibly the disk drive controller although, as we'll see, it has a multitude of other functions.

The disk controller circuitry of the BEST is really high tech, having gone through a number of revisions for a maximum of niftiness. It employs a digital phase locked loop system which, while meaningless to well over ninety eight percent of the human and quasi human races, combines both high disk access speeds with intense reliability. It worked well for us, anyway.

The disk board has a number of other useful appendages, however. There's a perpetual real time clock which has its own little in house battery stuck up there with it. As such, it keeps track of the fleeting moments of eternity even after you zap the power switch for the evening. There are also serial and parallel ports oozing off the thing which emulate those of the real blue box. The serial port is based on the 8250 communications chip... which makes it completely programmable in software. The parallel port will drive the printer of your dreams provided it comes equipped with a Centronics type interface.

In short, the system can do pretty well all

the peripheral functions expected of an IBM compatible. In some cases it actually manages to do 'em a bit faster or a bit neater. However, it does seem to maintain a fine degree of cooperation with the original specifications of the IBM... the real one... and, as such, users of the system should be able to expect a minimum of software freakouts that weren't planned on by the distributors.

In addition to business packages we ran a few more interesting things on the BEST. BASICA, the enhanced Microsoft BASIC package that comes with the MS DOS disk, was a trip. The video card's colours were sharp and rich. Things clipped along rather nicely... you could do pretty decent screen manipulations and such with the PUT and GET commands and be rewarded with absolutely no snow or even mild frost on the screen. In fact, all of the freaky graphics and sound commands of the BASICA implementations flashed and toodled without a hitch. I could have cheerfully plotted and schemed with it all day.

The last thing I tried on the BEST was the Microsoft flight simulator. This is a very sophisticated program with a custom DOS that has succeeded in crashing on some systems long before the little airplane nosed into the runway... or the grass... or the control tower... or the lake. It handled as well on the BEST as it has on any of the other systems we've successfully run it on. The longest time anyone managed to keep the plane in the air was three and a half minutes or so, which is about average. However, the Computing Now! rules for the game are a bit strange, and in-



The BEST without. The colour monitor is optional

volve achieving a high velocity just prior to impact rather than a survivable landing.

The BEST Choice?

The BEST can, as we noted earlier, run under your choice of two operating systems. MS DOS is the most popular of the two. A product of Microsoft, it is essentially equivalent to PC DOS, the package that is included with the real IBM PC. It's a fairly decent package, coming with a full house of utilities including two BASICs, one of which supports all the heavy duty graphics we've been speaking of.

MS DOS is probably the best choice in operating systems if you plan to use the system for business applications or run primarily pre-packaged software. It's also a decent scene if you plan to do a lot of BASIC programming, as the BASIC is already included. It's not bad for hacking at the machine language level, as the disk has a pretty high brow assembler, Macro 86, stuffed into the cracks and crannies, and there's pretty decent information on the operating system available.

CP/M 86 is primarily an advanced development operating system, ideal for

hackers but unnecessarily complex for running applications under. It supports much of the same command structure of regular CP/M 80, so it's not a bad choice if you are already familiar with the wonders of Digital Research from other incarnations. Its chief attribute is an exhaustive HELP file on disk which will virtually explain the operating system without recourse to a manual.

The BEST itself, as we've noted, is happy with either. It will run under whatever disk it discovers in its "A" drive when it's powered.

The BEST is a well put together system. The design appears to be properly thought out, and, more to the point, compatible with the IBM's software. It is cheap enough to be a personal system but it's also sufficiently serious to make it in a business environment. Its fierce looking fan cooled power supply can run for eight or ten hours on end without getting too toasty.

There's a fairly good rule of thumb or large toe to apply to buying a clone. If you want the stability and long term corporate eternity of a real IBM then you should buy one... if you can get a large enough mortgage on the cat. If you can relate to a clone system you should probably go shopping for the least expensive system which suits your needs and isn't being sold off the back of a pickup truck.

For many applications, the BEST is probably at least better than most.

Argh, Billy me bucko, they're gonna be lookin' mighty damn foolish if'n they ever bring out an improved model o' this'n...

CNI

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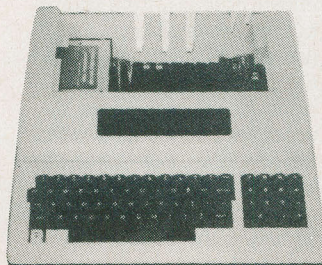
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Software Review

Atariwriter from Atari

One of the first uses I wanted to put my Atari to was word processing. But I am one of those rarities...a poor computer owner...so you can imagine my disappointment when I discovered that such software cost more than all my hardware put together! Salesman giggled when I told them about my little sixteen kilobyte, forty column cassette-based system, so I coveted business systems, typed in public domain junk, read the reviews...and waited

The wait was worth it. Atariwriter does almost everything you could want, costs less than every competitor worthy of comparison, and can be mastered in a few hours. It uses very little of my precious memory, and supports tape file storage. It's a word processor for Everyman (as opposed to Everybusiness).

A sixteen kilobyte ROM cartridge, Atariwriter uses only one K of RAM, leaving room for about nine double-spaced pages. With forty-eight K, you have about sixteen pages because the cartridge supplants sixteen K, but with chainprinting there is no limit to how much you can get on paper.

'Keep it simple' is the word throughout. One menu with eight one-letter commands handles everything. Other than the standard Load-, Save- and Delete-a-file options, you can see an alphabetical disk Index (and print it...handy!) and Format a disk, so you're never without space for your creation. More about Print and Atariwriter's unique Print Preview feature below.

Slap the cartridge into the slot, and you can begin writing with either Create or Edit, depending on whether you want to keep default format values or continue with those saved with a file. In either mode, you can write,

edit, rewrite or format with no flipping back and forth. The page wraps around and you can move, copy or delete characters, words, sentences, even blocks of text, at machine-language speeds. There are thirteen commands just for cursor-jockeying!

I don't begin writing by changing defaults, but any one can be changed, anywhere in the text, by a two-key command, and where appropriate, a value. An inverse-video character or symbol results, which is saved along with the file. At the top of the file are half line defaults for all four margins, paragraph spacing and indentation, font, and justification. The same system marks page numbers, centering (and blocking text left or right), underlining, section levels and headings, headers and footers, sub- and superscripts, and print instructions for chaining files, double-column layout, page eject and wait-'til-I-get-some-paper-in. You can even leave spaces to be filled in before printing, allowing form creation and a primitive mail-merge.

Once you enter a menu or in-text command, you are lead through the amenities by questions or instructions in the friendly Message Window. Press SELECT-'S', for instance, and you are asked what to search for; you can find any word or part of a word, phrase or sentence, making the process as specific or as general as you want. Beginning at your cursor, Atariwriter finds the first instance, then asks if you want to replace the string. If you answer 'Y', the string is supplanted with your change, and Atariwriter asks if you want it replaced globally. If you answer 'Y', everything happens in the blink of a CRT, and you're at the end-of-file, ready to write again. If 'N', it asks if you want to continue, and, if you're agreeable, finds the next in-

stance of the string. I pop appropriate 'clues' into my text, then return to them using Search...a real timesaver; I have a list of words I consistently misspell, so I let Atariwriter do the checking. If it weren't so painless, it would be insulting.

Atariwriter has seamless error-trapping and a phalanx of failsafe routines. Mistakes can't be passive: you can't just type over the text you want to replace...you have to actively delete the garbage, or it just shuffles along ahead of what you're inserting. You are asked 'Are you sure?' in various ways; information you might need (current filename, error message, memory available, often with a warning 'beep') appears magically in the Window; and anything you delete can be reclaimed from a buffer if you have second thoughts. I've never lost a word, let alone a file. The manual is even friendlier, with examples of uses, and an alphabetical reference guide. A handy card summarizes everything.

The writing done, I generally add formatting commands as I proofread. Pressing OPTION-'P' calls up the Print Preview, Atari's answer to eighty columns. More questions to answer, and your masterpiece appears as it will be printed, up to one hundred and thirty-two columns wide. To see the whole page, you must scroll your forty by twenty-one window around with superfast cursor controls. It's a simple but uncomfortable solution I use only to satisfy myself that the printed page will look right. It's annoying even to proofread, so working with the first Atari word processor, which did everything in this mode, must have seemed like writing in the bottom of a milk carton!

Atariwriter supports all Atari printers, of course, but most users own Epsoms or clones. There are two solu-

tions to this dilemma. Printer drivers, which are essentially control-code translators booted at the start of the session, are becoming available from Atari Program Exchange. And the familiar 'embedded control codes' (CONT-'O' and your printer's code) should allow you to squeeze out all your printer's potential.

At roughly ninety dollars Canadian, and dropping, Atariwriter offers good value. The only competitor I've identified is Textwizard, which was written, it is rumoured, by the same person; if you have better resources (32K, a disk drive, and an 850 Interface), you might consider it.

Atariwriter may be the word processor of choice for most Atari owners, even those with bigger systems than mine, because of its cost and friendliness. Once again, Atari has supplied people who don't really know what they want, with a product they won't outgrow for a while.

-Kevin M. Clarke

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Vic Routines and More 64



The VIC-20 and the Commodore 64 are pretty cool under BASIC... but they really start to tap dance and bellow like partially drunk grog trolls when you get inside them and fiddle about in machine language. Here's a look at some of the tricks you can play on them.

by Steve Rimmer

Computers haven't gotten any less complex... they've just gotten better at appearing simple. Home systems that are designed to be used by beginners can be the most sophisticated little munchkins within... all that firmware is needed to make the thing crashproof, friendly and powerful.

The VIC-20 is probably one of the best examples of a powerful computer pretending to be mildly stupid. It's cool enough for

kids or even a Liberal cabinet minister, but, once you get inside it, it's a very powerful beast. There are all sorts of things you can do with the internal ROM routines and calls, and plenty of stuff to play with.

Most of these can be applied to the Commodore 64 as well.

Pointers

To begin with, all meddling with the internals of the VIC pretty well have to be done in machine language... aside from SYSing to a few KERNEL routines, BASIC restricts you to its own... admittedly safe... little dungeon. You can't manipulate the registers or the stack of the processor, two things which are somewhat essential to use the workings of the VIC effectively.

In order to use the VIC at the machine language level you have to have a monitor program. There are a number of these available, including the Machine Language Programmer's toolkit thing and VICMON, a public domain version of Supermon which loads in from a tape.

It doesn't actually matter which one you use... the code, and the way it's dealt with, remains the same.

Software Review

MARCH 1984

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WIZARDRY III: LEGACY OF LLYLGAMYN

Sir-Tech software Inc.

This is the third and most recent of the acclaimed Wizardry series. From one to six players will try to save the kingdom of Llylgamyn from impending disaster. A Dungeons and Dragons - type game, it contains lots of heraldry and sorcery - a favourite of the serious player. Game one is required to generate characters for this one.

WIZARDRY HINTS:

The Toronto Wizardry Interest Group (TWIG) gives us these hints in playing and enjoying Wizardry. Wizardry I: Beware the deadly ring! Wizardry II: Don't get stoned more than once! Wizardry III: Teleport to the North-East corner of the room.

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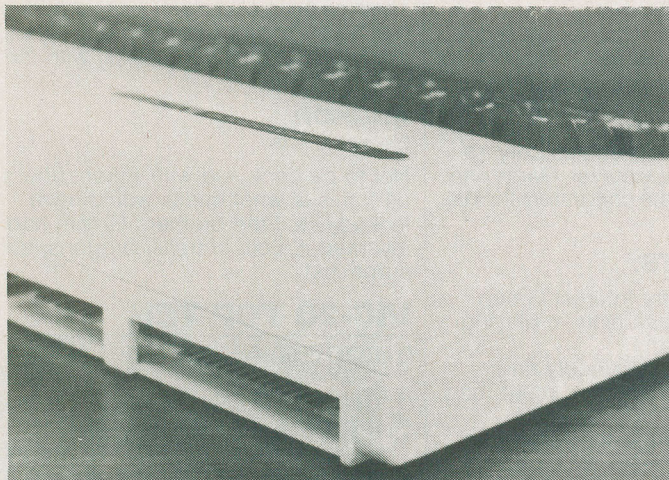
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Vic Routines and More 64



The VIC User Port

Let's start with something fairly simple. The VIC has a built in screen editor to allow the modification of BASIC program lines. While fairly decent for this, it is uncommonly hard to implement for any other purpose. While you can use the flashing cursor provided by the system as if you were in the direct mode while under program control, the thing likes to leave garbage about the screen and is very hard to control.

It's actually a lot easier to use your own private cursor and screen manipulation routines. All you have to know is where to PEEK and POKE... or rather, LDA and STA.

The screen memory of the VIC lives at \$1E00 if you have a raw, unexpanded VIC and \$1000 if you add some extra chips. In fact, the exact location is, surprisingly, unimportant. You see, down in the depths of page zero there is a two byte pointer into the screen memory which will always be looking at the first of the twenty two bytes which make up the line that would have the cursor on it if there was one.

There is also a byte which will always hold the number of bytes along that line that the cursor is positioned.

Given this admittedly tenuous information, it is possible to deduce the location of the cursor, or, rather where the cursor should go, since we are up for putting it there ourselves. There is an addressing mode in 6502 which allows you to specify a location in memory by pointing to the address of that location in zero page.

This is a bit confusing at first. Check this out. Usually, if you want to point to a location in memory you say something like LDA \$1000. However, there is another way of doing this. You could say LDA (\$22), where the memory locations \$22 and \$23 contain the number \$1000. In essence, then, when addressing stuff in this mode the 6502 doesn't go to the address you specify directly but, rather, goes to the address in the address you specify.

In fact, this mode always has an index. This is to say, there is always something added to the address down in zero page. The form is, properly, LDA (\$22),X, which means, get the address in locations \$22 and \$23 of zero page, add the X register to them and then look at the resulting location.

By this point, the mechanism for creating our own cursor should look pretty simple. We put the number of characters along the line the cursor is to be in either X or Y and direct the 6502 to that pointer in zero page that indicates where the current screen line is in RAM. The resulting location will be where the cursor is supposed to be.

By using a synthetic cursor, it's possible to control it when we want to make the screen do something. Since cursor garbage only occurs when there is screen movement and the cursor is on, the ideal solution is to make sure that it goes off before anything is printed. Here's how to do that.

```

LDA #$01
STA $CC      ;DISABLE THE REAL CURSOR
LDA #$80
STA $02BA    ;MAKE ALL KEYS REPEAT
LDA #$93
JSR $FFD2    ;CLEAR THE SCREEN
LDA #$3F
STA $900F    ;SET UP BACK GROUND
CLP1 JSR FLIP ;FLIP FAKE CURSOR ON
CLP JSR $FFE4 ;INPUT A CHARACTER
CMP #$00
BEQ CLOOP    ;LOOP 'TIL CHARACTER GOT
CMP #$03
BEQ END      ;STOP IF 'STOP' KEY HIT
JSR FLIP     ;FLIP FAKE CURSOR OFF
JSR $FFD2    ;PRINT CHARACTER
JMP CLP1
END BRK      ;BACK TO MONITOR
;
FLIP PHA     ;SAVE CHARACTER ON STACK
LDY $D3      ;GET POSITION ON LINE
LDA ($D1),Y  ;GET POINTER INTO SCREEN RAM
CMP #$80     ;IS CURSOR ON?
BCS FLP1     ;IF SO, TURN IT OFF
ADC #$80     ;OTHERWISE TURN IT ON
JMP FLP2     ;AND SHOW IT ON THE SCREEN
FLP1 SBC #$80 ;UNREVERSE CHARACTER
FLP2 STA ($D1),Y ;PUT CHARACTER ON SCREEN
PLA          ;GET CHARACTER OFF STACK
RTS
    
```

This program produces a simple unflashing cursor, but it does behave just like the one available in the BASIC command mode. In essence, it works by simply reversing and unreversing the character on the screen pointed to by the page zero pointers we've been looking at.

A Time For Song

Perhaps a more readily understood form of 6502 addressing... one which is certainly used a lot more frequently in simple programming, is straight indexed addressing. In this trip, you pick a starting point in memory and then add to it by changing the value of a register. It is usually of the form LDA \$1000,X, which means to load the accumulator from the location X byte beyond \$1000... or \$1000 itself if X holds zero.

This is very useful in printing short strings or scanning small tables. The "short" and "small" bit means less than two hundred and fifty six bytes long, since that is the largest number one can have in the X register. If you want to handle more than this, you have to set up a zero page addressing thing like we saw a moment ago... a much more complex procedure. Here's how one would print a string using an index.


```

LDX #$00      ;POINT TO THE FIRST BYTE
LOOP LDA STR,X ;GET BYTE INTO ACCUMULATOR
CMP #$00      ;ARE WE AT THE END?
BEQ DONE      ;IF SO, BE GONE
JSR $FFD2     ;PRINT THE CHARACTER
INX           ;POINT TO THE NEXT CHARACTER
JMP LOOP      ;GO AGAIN
DONE BRK      ;BACK TO THE MONITOR

STR ASC 'ELECTRIC WOMBATS'
DFB 0

```

Now, there are a few things to note in looking at this. First off, you will have to put a string of bytes which represent characters down at the location represented by STR. These don't all have to be letters. You can have cursor movement codes, #\$93 to clear the screen, colour codes and so forth. The only thing you can't have is a zero. This has to be the last byte in the string, because this is what tells the program that it's finished printing and can stop.

Here's another one. This uses a similar sort of program to play music with one voice of the sound generator in the VIC.

```

LDA #$0F
STA $900E      ;TURN UP THE SOUND
LDX #$00      ;ZERO THE INDEX
LOOP LDA TUNE,X ;GET A NOTE
STA $900B      ;PUT IT IN THE NOTE REGISTER
TXA
PHA            ;SAVE THE INDEX ON THE STACK
JSR WAIT       ;WAIT A WHILE
PLA
TAX           ;GET INDEX BACK OFF STACK
INX
CPX #$16      ;ALL DONE?
BNE LOOP      ;LOOP 'TIL FINISHED
LDA #$00
STA $900E      ;SILENCE
BRK           ;BACK TO MONITOR

TUNE DBF $E7,$E4,$E1,$D7,$E1,$E4,$E7,$E8,$E7,$E4
DBF $EB,$E4,$E7,$E8,$E8,$E1,$E7,$E4,$E1,$DF
DBF $E1,0,0,0

```

This plays the first bit of the Rondeau, otherwise known as the theme from Masterpiece Theatre. You can change the tune by changing the notes in the tune table. However, the important thing about this program is not what's here, but, rather, what isn't. As you may have noticed, there is a subroutine call to something called WAIT. If you have followed the logic of the program, WAIT is something which pauses for the duration of the note being played. In other words, you enable the note, wait for it to sound for a time and then disable it.

Waiting is not something that's particularly easy to program in large quantities. Even counting up to extremely large numbers, as with nested loops and such you don't get really decent waits. There are other techniques, of course, but one of the easiest ones to make happen with the VIC is to simply use the system's internal clock.

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Vic Routines and More 64

As you've probably already discovered, the VIC maintains a real time clock. It's readable from BASIC through TI\$. Its value is kept in three bytes down in zero page, \$A0 through \$A2. It is, in fact, interrupt driven... which also probably bears some explaining.

In essence, whenever you have the VIC running there is a pulse going through it sixty times a second. Every time the pulse happens, the VIC breaks out of whatever program you have it running and rips off to do some housekeeping for a few milliseconds. Among its duties herein are updating the clock and checking the keyboard queue.

You can't actually see this happening and it doesn't affect your programs even with machine code stuff 'cause it's all carefully managed to appear invisible to the user. However, no matter what you do the clock will still keep time.

There is a routine in the VIC's firmware, \$FFDB, which allows the clock to be set. If you call it, the three zero page locations which hold the clock's values will take on the values of the A, X and Y registers, the A being the most significant byte. If you load all three registers with zero and call this function, the clock will immediately start over as if the system had just been powered.

Having done this, getting a specific wait out of the thing is easy.

```
WAIT LDA #$00
      LDX #$00
      LDY #$00
      JSR $FFDB ;ZERO THE CLOCK
WT LDA $02 ;GET THE LEAST SIGNIFICANT BYTE
CMP #$0D ;HAVE WE WAITED LONG ENOUGH?
BCC WT ;IF NOT, WAIT SOME MORE
RTS
```

This, of course, will trash the real time clock's original contents. If you want to preserve these, you will have to copy the three bytes from \$A0 to \$A2 into some memory or save them on the stack, perform the wait and then replace the original values back in place adding the time waited to them.

In Every Port

If you feel like experimenting with the outside world you might want to try meddling with the VIC's user port. This is a card edge connector on the back of the VIC opposite the side where the power switch is. It provides, among other things, an eight line input output port which can communicate with reality. While this may sound a bit hairy, it's actually dead easy to use.

To begin with, what you actually have here is eight wires. Depending on how you set up the port, these can be either eight switches to turn things on and off or eight sensors to read the state of eight voltages outside the VIC. You can have any combination of these two functions in one port.

For the purpose of discussion, the port has two important locations. The port itself is at \$9110 and the *data direction register* is at \$9112. We'll get to what this all means in a moment.

The port has, as we've said, eight lines. A number in the VIC has eight bits. This seems like a curious co-incidence. In fact, these things happen like this for a fairly decent reason. While you may represent a number as a decimal or hex expression, the VIC sees it in binary. Thus, the number 65 decimal or \$41 hexadecimal is 0100 0001 to the VIC. This corresponds to two to the power of zero plus two to the power of six.

This number in the port would correspond to a high level on lines one and six. While the conversion may seem a bit tedious, you can probably see how the numbers and the positions of the high and low port lines correspond.

If you make the port into an input port, which is how you'll find it when the VIC is first powered, connecting lines one and six to a five volt supply... a logical one... will cause the number \$41 to appear in location \$9110. If you make the port into an output port and put the number \$41 into it lines one and six will go high.

You can have any combination of lines high and low by choosing the correct number to put into the port.

You can also test to see if any particular line is high. If you want to see if line six is high you can *mask* the byte in the port so you're only looking at the bit you are interested in. Consider this

```
LDA $9110 ;GET NUMBER IN PORT
CMP #$40 ;SEE IF LINE 6 IS HIGH
```

This will only work if line six is the only one which is high at the time. However, there may be other things happening on other lines which won't affect line six but will alter the status of the port as a whole. Thus, you can mask off unwanted bits... like the Lone Ranger or Zorro...

```
LDA $9110 ;GET NUMBER IN PORT
AND #$40 ;IGNORE ALL OTHER BITS
```

Now, no matter what other bits are set you can test for the state of line six. Once again, this works for any line or combination of lines if you choose the right number to use as a mask.

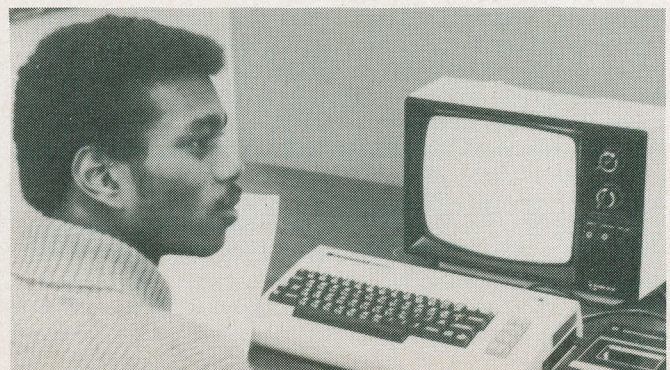
The heretofore briefly mentioned other location of meaning for the user port is the data direction register, \$9112. The DDR seems really complicated, but you can look at it as simply a collection of eight switches. Each switch sets its corresponding line in the user port to be either input or output. If the switch is on... if the appropriate bit of the DDR is a one... that line in the port is an output. If the bit is zero it's an input.

If you load the DDR with \$41, lines six and one of the user port will be output lines. Everything else will be input lines. If you load the DDR with \$FF the whole user port will be an output port and if you load it with zero the whole mess becomes an input port.

Ultraboot

Finally, if you are really interested in hooking into the VIC you may be interested in one of the most closely guarded secrets of the machine... how the game ROMs work. It's weird.

When you turn the VIC on it normally pops right into BASIC. However, if you have a game cartridge plugged into it, the computer will automatically sense its presence and run that instead.



In fact, prior to booting BASIC it checks for a code pattern at location \$A000, the beginning of the area reserved for plug in software, and, should it get the secret handshake and pass muster, runs the code in the ROM it's found... ignoring BASIC entirely.

You may not want to write video games, but there are often times when one would like to put a ROM in this area and have the VIC run what's in it before going to BASIC. Here's a simple example of how to use this little mindwarp.

```
A000      $00
A001      $0A
A002      $00
A003      $00
A004      $41
A005      $30
A007      $C3
A008      $C2
A009      $CD
A00A      JSR $FD8D      ; INITIALIZE SYSTEM CONSTANTS
          JSR $FD52      ; SET KERNEL
          JSR $FDF9      ; INITIALIZE I/O REGISTERS
          JSR $E518      ; INITIALIZE I/O
          CLI            ; ENABLE KEYBOARD AND CLOCK
          LDA #$08
          STA $900F      ; MAKE THE SCREEN BLACK
          LDA #$9E
          JSR $FFD2      ; MAKE TEXT YELLOW
          JMP $E467      ; START BASIC
```

While this may look really weird, it's actually pretty straightforward if you keep in mind that the head that wrote the VIC's code probably worked for the RCMP. In order to determine whether there is a valid ROM at location \$A000, the VIC looks for five bytes beginning with location \$A009 and ending with \$A004... yes, it goes backwards just to be weirder still. If the five bytes shown here are present it does an indirect jump using the bytes at \$A000 and \$A001 to whatever is... hopefully... in the ROM.

If you use one of these things you'll find that the system has not been completely initialized by the time the thing comes to look for a ROM pack, and the programmer is thus responsible for executing the four subroutines shown here and clearing the interrupt system so the keyboard and the other interrupt driven devices will work.

This simple program can be loaded into an EPROM and set at \$A000 to have the VIC come up with a black screen and yellow characters instead of the traditional blue. You can, of course, put any code you want into the ROM... in fact, you need never enter BASIC at all if you are writing a dedicated application for the VIC.

Last Call

There are, of course, heaps of additional things you can do with the VIC's firmware and innards... these bits should get you going, though. If you spend a bit of time with a machine language monitor and the VIC Programmer's Guide you will be thoroughly freaked at the sorts of things you can get the three K plastic dwarf to do for you.

Let them bytes fly.

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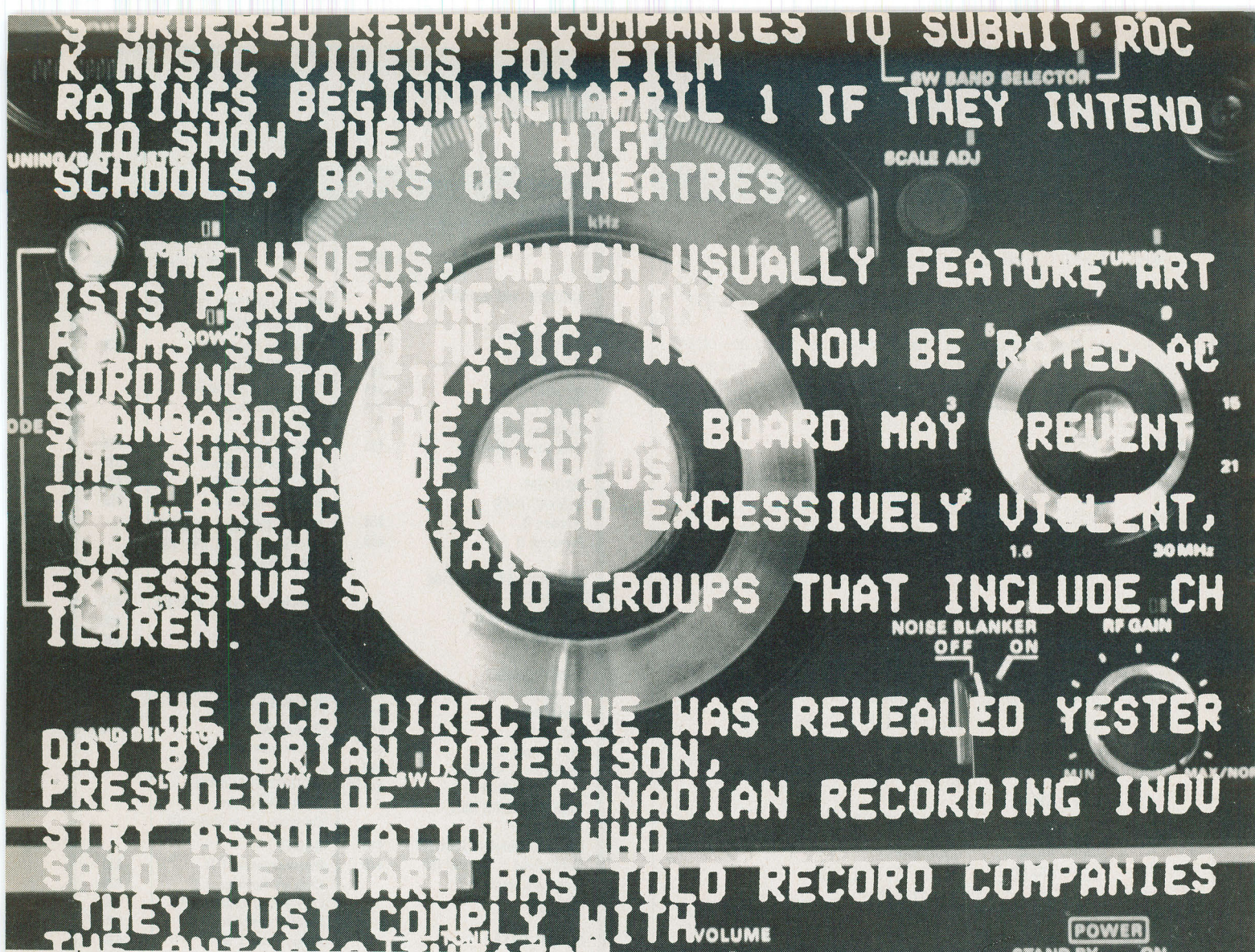
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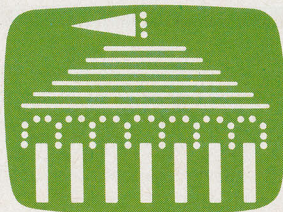
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by Robert Traub

In receiving radio teletype signals the demodulator... the thing which converts the variable pitch tones that come from the radio into serial computer data... plays perhaps the biggest role in the system. A good unit, such as the one presented here, has the dual advantages of being reliable in setting up the whole affair and sophisticated enough to reject large amounts of atmospheric interference when you actually get it working.

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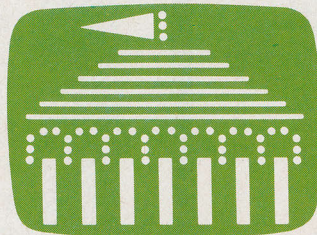
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Skyhook Your Apple

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The demodulator is easily put together by anyone with a soldering iron and a little time.

Internal Trolls

Figure one is a complete schematic diagram of the ST-5 radio teletypewriter demodulator. Notice that the schematic includes a tuning meter and provisions to drive the horizontal and vertical axis of an oscilloscope for monitoring of the mark and space tones. You don't have to have these devices in operation unless you want to... they're in the circuit, though, for users who want to look really high tech. You will,

however, need a meter for the initial setting up.

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millivolts, to produce a full swing square wave output of about ten volts peak. The output of the limiter feeds a discriminator detector stage which separates the two audio tones that represent the logical levels of the serial data.

The demodulator can be designed to operate with either an eight hundred and fif-

ty hertz shift or the now more common one hundred and seventy hertz shift. Using the one hundred and seventy hertz shift, the two audio frequencies employed are 2125 hertz for mark, and 2295 hertz for space... the component values in this article are for this standard. It's worth noting that many of the commercial news services use a shift of four hundred and fifty hertz. In this case, the tones are 2125 hertz and 2575 hertz. Also, they generally operate at a transmission rate of one hundred bits per second.

The detector circuit features full wave rectification of the audio signal to obtain the best filtering for any remaining ripple. It also employs a low pass filter to remove the remaining audio components.

After the signal has been detected it is passed on to the slicer stage which takes the small voltage presented by the filter and amplifies it to approximately ten volts peak. Ten volts positive represents the mark signal and ten volts negative the space signal.

Due to the ST-5's usage of op amps, a dual voltage power supply is required.

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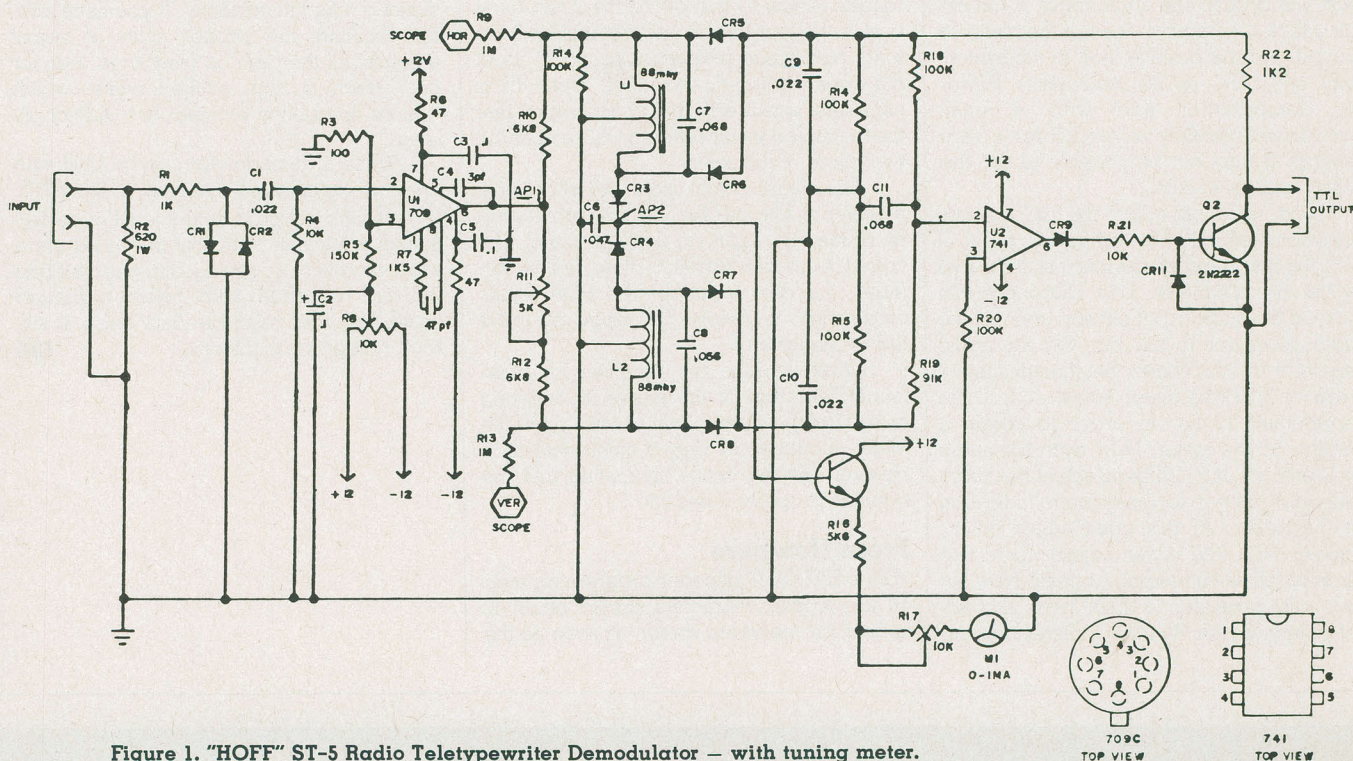


Figure 1. "HOFF" ST-5 Radio Teletypewriter Demodulator — with tuning meter.

Looking at the schematic diagram of the St-5, you will notice that the space and mark filters each use an eighty-eight millihenry toroidal inductor. When used in the St-5, the toroidal inductors are connected in a series configuration as shown in detail A of figure two.

In order to tune each of the filters, an audio generator, frequency counter, a one hundred kilohm resistor and an multimeter will be required hooked up as shown in figure three. The idea here is to place the appropriate capacitor in parallel with the coil and tune the audio generator carefully, looking for a peak reading on the meter. At the point where the peak on the meter is found, check the frequency indicated by the frequency counter. This is the natural resonant frequency of the combined coil and capacitor.

In the event that the frequency is too low, you can increase it by either removing a few turns from the coil, or by decreasing the capacitance. Most of the capacitors that will be used for this circuit have a standard tolerance of twenty percent and, for this reason, the frequency may be set correctly by simply substituting different capacitors of the same value. It is best to tune these filters slightly low of the desired frequency as they will increase a bit when installed in the circuit.

Look For Smoke

Once the filters have been tuned and the board completed you will have to perform a few other adjustments in order to optimize the performance of the demodulator. The first of these is best performed with a zero centered DC voltmeter, as it will cause the needle to swing rapidly between positive

and negative twelve volts. However, any DC voltmeter can be used by simply reversing the polarity.

The purpose of this adjustment is to get the value of resistor R8 set such that the voltage output at pin six of U1 is as close as possible to zero. To accomplish this you

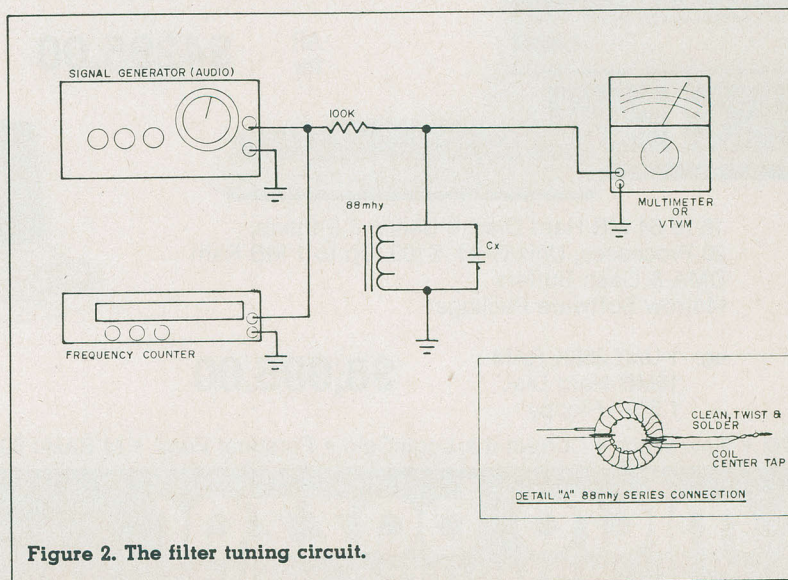


Figure 2. The filter tuning circuit.

Skyhook Your Apple

must first ground the audio input of the circuit. Hook the negative lead of the meter to ground and the positive lead to adjustment point one (AP1 on the schematic). Power the demodulator and with a small screwdriver carefully adjust R8 for a zero reading. It may not be possible to get this setting exactly at zero.

Next, we must adjust the AC balance potentiometer, R11, for an equal output of both the mark and space tones as indicated by the circuit's meter. First, disconnect the short on the audio input pin and connect the audio generator to this pin. Set the audio generator to 2125 hertz. Set the adjustment screw of R17 (the meter adjust pot), to the approximate center in order to obtain a reading on the meter. Now, with the audio generator set at 2125 hertz adjust the audio generator output for maximum indication on the meter. At this point adjust potentiometer R17 (the meter adjust), for a two thirds of full scale reading at peak. Now set the audio generator to 2295 hertz and adjust potentiometer R11 for a meter reading

reading equal to that of the the 2125 hertz output. Repeat this procedure until both the mark and space frequency produce about the same reading on the meter. When this is complete, again adjust R17 to ensure that the maximum meter reading will be at about two thirds of full scale.

The audio signal from the shortwave receiver is fed into the demodulator at the point marked *input* on the schematic. The output from the circuit is then fed to pin three, the data input, of the PDA 232C card's serial connector. The signal ground is fed to pin seven.

Carefully tune the receiver for maximum deflection of the meter on a strong radio teletypewriter signal. At this point the meter should show only a small deflection between the two tones, indicating that the signal is properly tuned in.

From Nowhere

With a BAUDOT decoder program running on the Apple, characters should begin to appear on the video screen as soon as the

signal is tuned in correctly. If you have trouble locating the proper type of signal amongst all the hash on the bands, look for one which is high pitched whine which "chirps" frequently between two distinct pitches.

While a demodulator can be built with fewer parts than are involved in the ST-5, few circuits will provide the level of performance attainable with this one. The extra work involved in getting this one working will be rewarded with fewer garbled characters and readable data even in difficult reception conditions.

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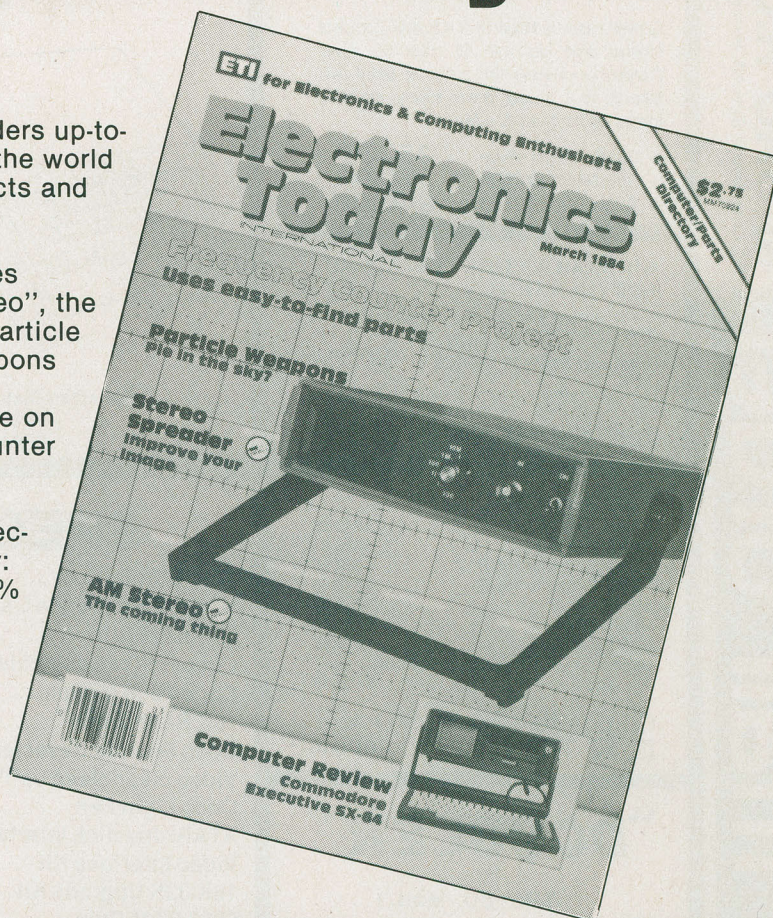
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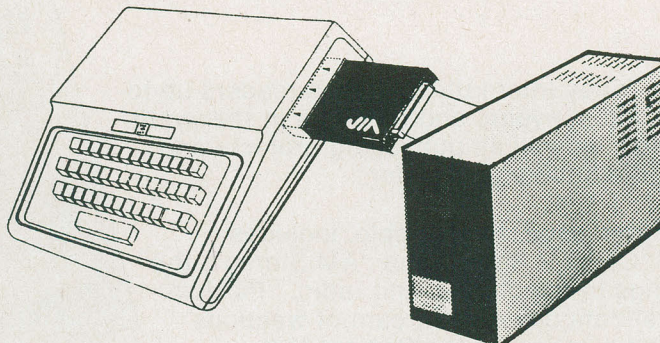
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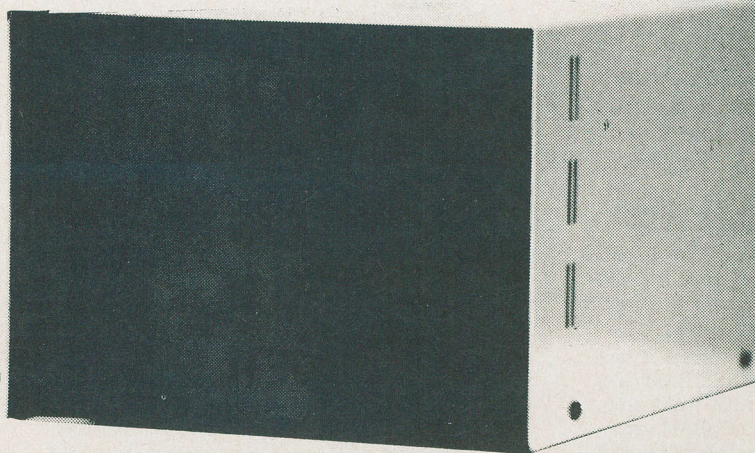
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There are a number of really wonderful things you can say about CP/M. It's small, ubiquitous, relatively cheap and flexible. It's not, however, friendly. Actually, friendliness is the furthest thing from its mind. It's nasty as hell.

If you are a determined computer hacker the user-unfriendliness of CP/M probably won't bother you too much. However, using CP/M in an environment like that of an office, which entails its operation by unsuspecting proto-humans, is entirely another trip. They can't get into wild cards, warm boots or any of the other stuff that CP/M loves to lay on otherwise decent beings when first they sit before it.

Eventually one can learn all the tricks that make CP/M happen, but if you are after doing some particular application rather than becoming a brilliant computer head, you probably won't feel like sitting around hassling with the control characters. There are ways to do away with them.

Yes, now, from the land of the living software monsters there comes... MENU. Never before in the history of bytes has something so useful done so much while killing so few gazelles. In fact, none of the test versions of MENU led to the direct demise of any gazelles at all, something of which we're all really proud.

MENU will make CP/M friendly.

A La Carte

MENU is a very simple shell program. A shell is something that lives between you and CP/M and makes things easier. Basically, it does just what its name implies. It sorts the disk you have in your system into a menu and presents you with all the runnable applications on it. Since all program files under CP/M must be of the type COM, it simply ignores everything else and gives you what is, in essence, the listing DIR *.COM.

The only tricky bit is that the files are arranged vertically.

Having gotten the directory together, the program will print a pointer up on the screen and allow you to move it up and down, stabbing its little phosphor digit at the various names before you. When it encounters one that you like, you can hit RETURN and it will run that program for you.

When the program is finished running the system will automatically blast you back into MENU again, and you can select something else.

If you make the disk boot MENU automatically... see "Polish That Buffer" in last month's issue for a look at how to do this...CP/M becomes almost foolproof. Well,

CP/M MENU



The legendary unfriendliness of CP/M borders on near hostility, and many applications which it is otherwise suited for become exercises in keeping the employees from sobbing hysterically. Put away that ether... you need MENU.

by Steve Rimmer

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CP/M MENU

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INX D ; ... POINTERS
DCR B ;BUMP COUNTER
JNZ MLOOP ;GO AGAIN
RET

;
GETENT: ;POINT H TO SELECTION
LXI H,DIRDUM ;POINT TO DIRECTORY
LXI D,11 ;LENTH OF ENTRY
LDA SEL ;GET ENTRY NUMBER
MOV B,A ;IN B
BLOOP1 DAD D ;MOVE DOWN NUMBER OF ENTRIES
DCR B ;IN A
JNZ BLOOP1 ;POINT TO ENTRY
INX H ;PAST TAB
RET

;
FILE: ;MOVE NAME INTO DMA
LXI D,DMA+1 ;POINT TO DMA
MVI B,8 ;LEN OF NAME
FILOOP MOV A,M ;GET BYTE
CPI ' ' ;NAME DONE?
JZ FINEXT
STAX D ;STASH IN DMA
INX H ;BUMP POINTERS
INX D
DCR B ;AND COUNTER
JNZ FILOOP ;GO AGAIN
FINEXT MVI A,8 ;GET LEN OF NAME
STA DMA ;INTO BUFFER
XCHG ;POINT TO BUFFER
MVI A,0 ;PUT IN NULL
MOV M,A
INX H ;NEXT SPOT
MVI A,'$' ;PUT IN END MARKER
MOV M,A
RET

;
WRITE: ;WRITE DMA TO FILE
MVI C,15H
LXI D,FCB
CALL BDOS
RET

;
KILLF: ;KILL OLD $$$SUB
MVI C,13H
LXI D,FCB
CALL BDOS
RET

;
MAKEF: ;MAKE NEW $$$SUB
MVI C,16H
LXI D,FCB
CALL BDOS
RET

;
FILL: ;FILL DMA WITH ^Z
LXI H,DMA ;POINT TO DMA
MVI A,E0F ;LOAD A WITH ^Z
MVI B,80H ;80H CHARS IN DMA
FLOOP MOV M,A ;PUT ^Z IN DMA
INX H ;POINT TO NEXT BYTE
DCR B ;BUMP COUNTER
JNZ FLOOP ;GO AGAIN
RET

;
CLOSE: ;CLOSE $$$SUB
MVI C,10H
LXI D,FCB
CALL BDOS
RET

;
PRMWAIT: ;SAY 'BOOTING'
MVI C,9
LXI D,WMESS
CALL BDOS

```

```

RET

;
SELECT: ;MOVE ARROW AROUND
CALL HCURS ;HOME CURSOR
LDA SEL ;GET LOCATION OF POINTER
ADI 3 ;GET PAST TITLE
MOV B,A ;IN B
CALL DOWN ;GO DOWN TO CURRENT POINTER
CALL POINTER ;PRINT ARROW
CALL HCURS ;HOME CURSOR AGAIN
CALL GETDIR ;GET INSTRUCTION
CPI CR ;GOT A SELECTION?
JNZ SELECT ;NO, LOOP
RET

;
GETDIR: ;GET ARROW DIRECTION
MVI C,6 ;SET UP FOR
MVI E,255 ;DIRECT CONSOLE INPUT
CALL BDOS ;ARG6666!
CPI UP ;UP CHARACTER?
JZ UPARROW
CPI DN ;DOWN CHARACTER?
JZ DNARROW
CPI CR ;GOT A SELECTION?
RZ
JMP GETDIR ;TRY AGAIN
UPARROW LDA SEL ;GET THE POSITION
CPI 2 ;ARE WE AT THE TOP?
JM GETDIR ;IF YES, TRY AGAIN
SUI 1 ;UP ONE
STA SEL ;REPLACE POSITION
MVI A,0 ;DON'T CONFUSE SELECT
RET
DNARROW LDA DCNT ;POINT TO BOTTOM
MOV B,A ;SAVE IN B
LDA SEL ;SEE WHERE WE ARE
CMP B ;ARE WE AT THE BOTTOM?
JP GETDIR ;IF SO, TRY AGAIN
ADI 1 ;POINT DOWN ONE MORE
STA SEL ;SAVE IT
MVI A,0 ;DON'T UPSET SELECT
RET

;
POINTER: ;PRINT ARROW
MVI C,9
LXI D,ARROW
CALL BDOS
RET

;
DOWN:
PUSH B ;GO DOWN NUMBER OF LINES
MVI C,2 ;IN B
MVI E,LF
CALL BDOS
POP B
DCR B
JNZ DOWN ;MOVE DOWN TO ENTRY
RET

;
HCURS:
MVI C,2
MVI E,HOME
CALL BDOS ;HOME CURSOR
RET

;
PBUFF: ;PRINT DIRECTORY
LXI H,DIR ;POINT TO START OF BUFFER
FLOOP MOV E,M ;GET A BYTE
PUSH H ;SAVE POINTER
MVI C,2
CALL BDOS ;PRINT BYTE
LHLD DPNT ;GET END LOCATION
DCX H ;POINT TO END OF BUFFER
XCHG ;GET END IN D

```

```

POP H ;GET POINTER BACK
INX H ;BUMP H
CALL COMPARE ;DO 16 BIT COMPARE
JNC LOOP ;LOOP 'TIL DONE
RET

;
COMPARE: ;16 BIT COMPARE HL & DE
STC ;CARRY TO 1
CMC ;ZERO CARRY
MOV A,D ;COMPARE D
CMP H ;... TO H
RNZ ;QUIT IF NOT EQUAL
MOV A,E ;COMPARE E
CMP L ;... TO L
RNZ ;QUIT IF NOT EQUAL
STC ;CARRY TO 1
RET

;
MOVEIT: ;MOVE DIRECTORY TO DIR
RLC ! RLC ! RLC ! RLC ! RLC ;A # 32
LXI D,0000H ;ZERO D
MOV E,A ;SET D,E EQUAL TO A
LXI H,DMA+1 ;POINT TO DMA
DAD D ;POINT TO ENTRY
XCHG ;PUT POINTER IN D,E
LHLD DPNT ;POINT TO DIRECTORY BUFFER
INX H ;POINT TO FIRST BLANK
MVI B,8 ;EIGHT CHARACTERS IN NAME
SLOOP LDAX D ;GET BYTE FROM DMA
MOV M,A ;PUT IT IN BUFFER
INX H ;BUMP COUNTERS
INX D
DCR B
JNZ SLOOP ;IF NOT DONE, DO IT AGAIN
INX H
INX H ;GET PAST CRLF
SHLD DPNT ;SAVE POINTER
LDA DCNT ;BUMP COUNTER
INR A
STA DCNT
RET

;
FIRST: ;GET FIRST DIRECTORY NAME
LXI H,DIR ;GET THE LOCATION OF BUFFER
SHLD DPNT ;INITIALIZE POINTER
MVI C,11H
LXI D,PRAMS
CALL BDOS
RET

;
NEXT: ;GET OTHER DIRECTORY NAMES
MVI A,0
STA PRAMS+14 ;ZERO S2
MVI C,12H
LXI D,PRAMS
CALL BDOS
RET

;
HELLO: ;SAY HELLO
MVI C,9
LXI D,HMESS
CALL BDOS
RET

;
HMESS DB CLS,TAB,'The Amazing Menu'
DB 'Driven Directory',CR,LF
DB TAB,'Copyright 1983 (c)'
DB 'Steve Rimmer',CR,LF
DB TAB,'
DB '-----',CR,LF,LF,LF,'$'
DB TAB,'Argh... there are no'
NOFILE DB 'runnable files!!!',CR,LF,'$'
DB '
ARROW DB '====>',CR,LF
DB

```


CP/M MENU

```

DB      ' ,CR,'$'
WTMESS DB  CLS,LF,LF,LF,LF,LF,LF,LF,LF
DB      LF,LF,LF,LF,TAB,TAB,TAB,TAB
DB      'Booting...',CR,LF,LF,LF,LF
DB      LF,LF,LF,'$'
PRAMS  DB  0,'???????COM',0,0,0,0,0
DS      32
DPNT   DS  2      ;POINTER TO NEXT ENTRY
DCNT   DB  0      ;NUMBER OF ENTRIES
SEL    DB  1      ;CURRENT ARROW POSITION
MENUBLK DB 'MENU      ;COMMAND TO REBOOT
FCB1   DB  0,'$$$      SUB',0
DIRDUM DB  TAB,'      ,CR,LF ;DUMMY
DIR    DB  TAB,'      ,CR,LF ;1
DB      TAB,'      ,CR,LF ;2
DB      TAB,'      ,CR,LF ;3
DB      TAB,'      ,CR,LF ;4
DB      TAB,'      ,CR,LF ;5
DB      TAB,'      ,CR,LF ;6
DB      TAB,'      ,CR,LF ;7
DB      TAB,'      ,CR,LF ;8
DB      TAB,'      ,CR,LF ;9
DB      TAB,'      ,CR,LF ;10
DB      TAB,'      ,CR,LF ;11
DB      TAB,'      ,CR,LF ;12
DB      TAB,'      ,CR,LF ;13
DB      TAB,'      ,CR,LF ;14
DB      TAB,'      ,CR,LF ;15
DB      TAB,'      ,CR,LF ;16
DB      TAB,'      ,CR,LF ;17
DB      TAB,'      ,CR,LF ;18
DB      TAB,'      ,CR,LF ;19
DB      TAB,'      ,CR,LF ;20
;
DS      60
STACK  DS  2
;
END

```

tions the program must thereupon snatch it out of there and save it somewhere before the next file name trots in and stomps it. In this case, we're storing the file names in the DIR buffer at the end of the program. This is all prepared with the proper control characters so that when the buffer is printed to the screen it will come up as a long column of names.

Note that each buffer entry is only eight characters long because there's no need to move the file extensions. They should all be COM.

An Arrow Into The Air

With all the file names safely ensconced in DIR, the program can now let humankind once more meddle with the system. It will print out the buffer and an arrow beside the first name. If you hit an X the arrow will go down. If you hit an E the arrow will move up. This is actually very hard to do, because most terminals don't have cursor addressing functions.

There are some cursor movement characters which are common to virtually all systems. One can pretty well always count on a line feed moving the cursor down one line, a carriage return moving it to the beginning of the line line it's on, and

so on. There are also usually two characters which will move it to the upper left hand corner of the tube... with and without clearing the screen. They're most often as I've defined them in the program, but you can change the equates if you find you have to.

Moving the cursor to any particular location, then, involves using these characters. To move from line ten up to line nine you would print a home cursor character followed by nine line feeds. While a bit involved, this works surprisingly well. It's also surprisingly fast. The process is too quick to see on almost all terminals, and the effect is that, in this case, the arrow simply zips up one line.

The arrow is, in fact, a blank line, an arrow and another blank line, so printing a new arrow always overwrites the old one with spaces.

If you hit a carriage return with the arrow pointing to a file name, the program will assume that you want to run that program. It will then clear the screen and print the word "Booting..." in the middle of the tube. Then... ah hah, we're onto the real tricky bit.

"MENU makes dealing with applications a lot less involved . . ."

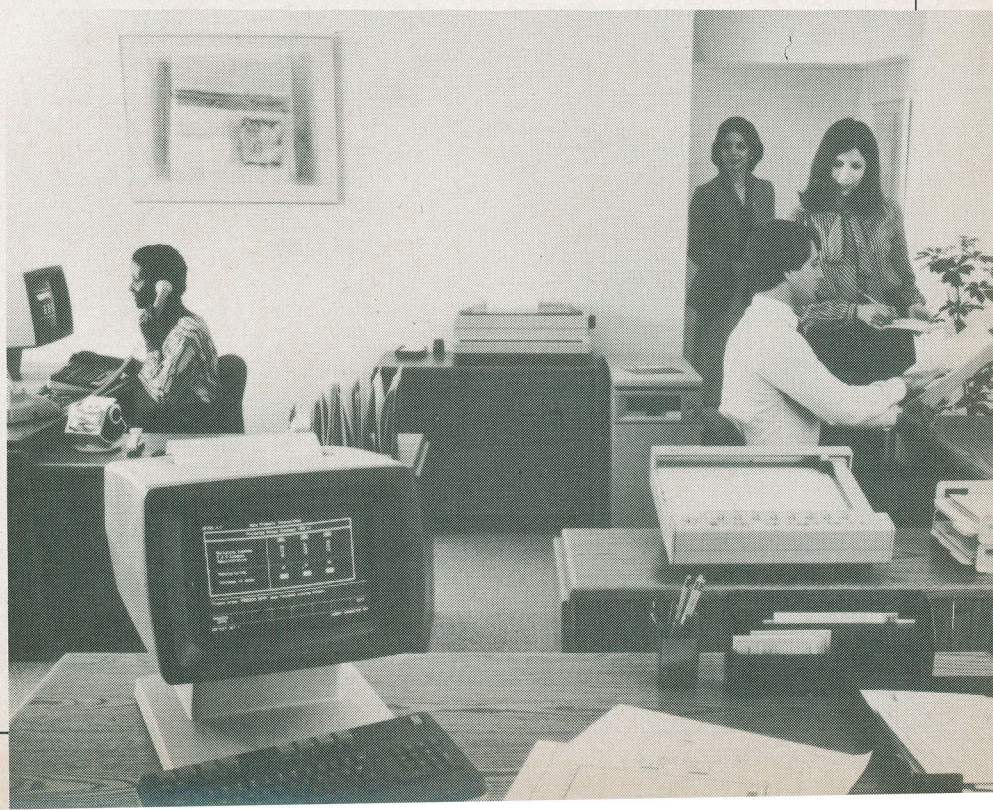
SUBMIT, You Fiend

In order to be really user friendly, the MENU program has to not only boot the program you select but also reboot itself when that program is done. As we saw in "Polish That Buffer", it's possible to make one program boot another, but this does not take care of getting back into MENU again when the aforementioned program slips away. You obviously can't go patching code onto the ends of all your applications.

There are several ways around this, but the only one which doesn't involve a lot of hacking is to have MENU create a SUBMIT file. As we saw in the December issue of CN!, SUBMIT files allow the stringing together of a number of programs. However, in this case, we'll go about mutating the SUBMIT function in a rather unusual way.

Whenever CP/M does a warm boot and returns to the command line prompt... the thing with the arrow head... it checks for the existence of a file called \$\$\$SUB, which is usually the first file on the disk if it's real. If it sees this file, it takes the last entry in it and pretends this is its command line, shortening the file by one entry in the process. It performs the command it finds and, when next returned to its command line, skims the last line off the \$\$\$SUB file again. It'll keep this up until the \$\$\$SUB file is reduced to a nubbin, at which time it will give up and go home.

Making MENU both boot a file and then



reboot itself, then, is fairly simple. The program has to create a two level \$\$\$SUB file with the first entry being the word MENU and the second entry the name of the file to boot. Remember, it does the last one first.

The structure of a \$\$\$SUB file is remarkably crude. Each entry is one sector, or one hundred and twenty eight bytes long. This consists of a number in the first byte which represents the length of the entry... you can actually fake this and make it eight, the maximum length of a file name... followed by the name followed by a null, zero, followed by a dollar sign. The rest of the buffer is padded out with control Z's, 1AH.

When the MENU program gets to the BOOT routine, it kills off any old \$\$\$SUB files that happen to be lurking about and opens a fresh one. It then writes two sectors to the file with the appropriate incantations in them.

This done, MENU nips off and kills itself in the sure and certain hope of a resurrection... one SUBMIT line later.

DIRections

There is very little to say about using MENU. It's best to avoid having more than about sixteen COM files on the disk at any one time, as the arrow will scroll the top line up one, and, thereafter, become confused and boot the wrong file.

You can make the thing more selective if you want to. If you only wanted to be able to MENU with files that start with, say, the letter Q you could make the PRAMS string be Q???????COM.

You may want to be able to use the program with CP/M's built in commands, particularly DIR. Since DIR is not a file, it won't show up on the menu even though it's a legitimate command. The way around this is to create a file called DIR.COM. This is easily done by doing SAVE 0 DIR.COM. Thereafter, DIR will show up on the directory listing for MENU. However, since CP/M runs its built in commands rather than its COM files when it has the choice, DIR.COM will never run. You'll get the DIR function instead.

The use of MENU should not affect the operation of any other applications you run on your system, with the exception of the one or two K of disk space that will be tied up by the \$\$\$SUB file it creates. It's a really easy way to make CP/M useful even when superhuman intellect and patience is not available.

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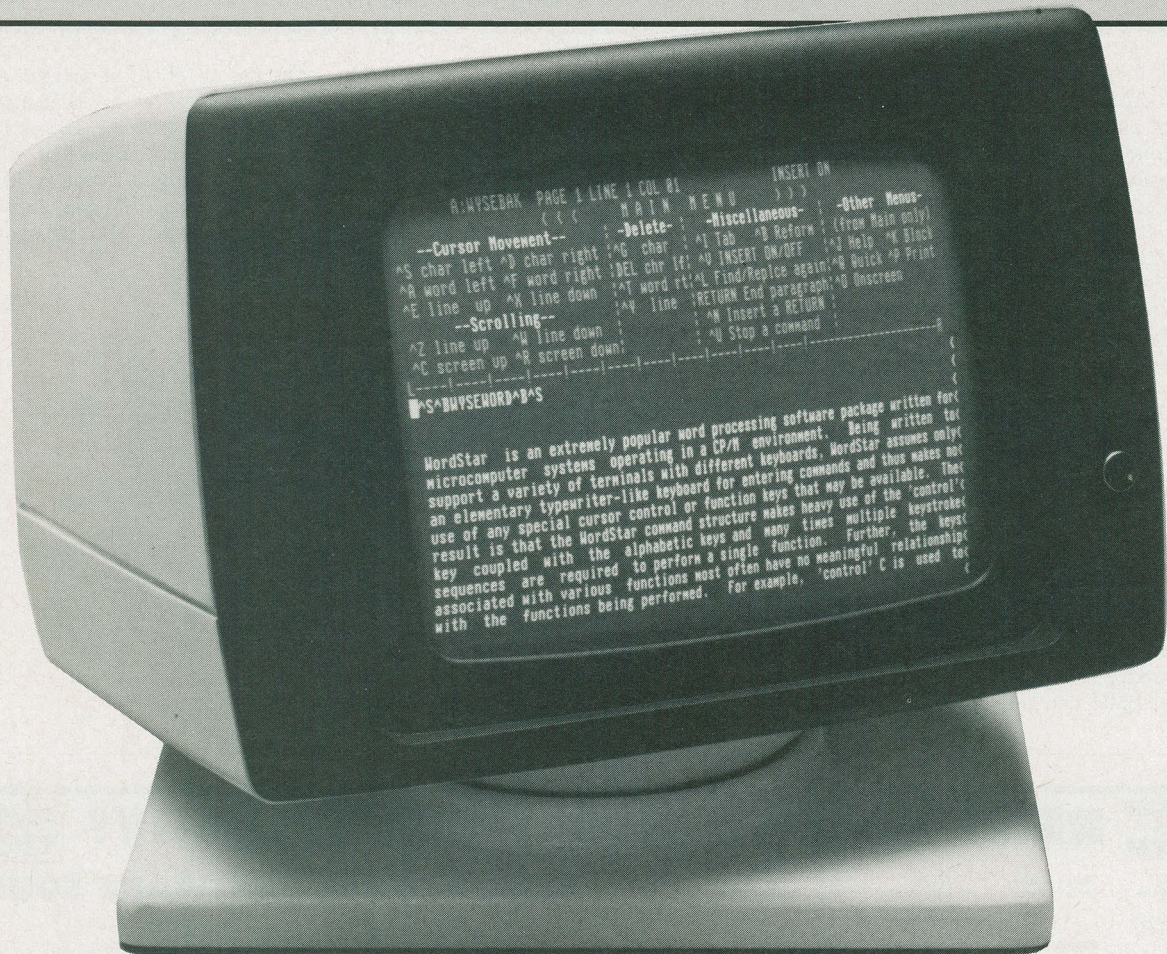
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The Very Last Apple Unhook



Yes, it's that time of year again. Spring is when all the little Apple unhooking routines crawl out of their holes and patch themselves into Wordstar. Here's yet another, and still more convenient, approach to this frequently encountered negativity.

by Steve Rimmer

One of the most pressing issues of our times seems not to be the solution to the war in the middle East or how to cure the multifarious diseases that plague mankind but, rather, how best to make Wordstar run on an Apple clone. We have had several shots at this problem... see

"Juice Your Apple" in the June issue of CN! and the "Unhook" program in November. However, each of these techniques had its drawbacks... the first entailed the ownership and subsequent use of an EPROM blaster and the second was great... unless you forgot to type UNHOOK before running Wordstar.

There are few things more frustrating than having sixteen K of text in your computer only to find that the control code you need to save it is being translated into a square bracket.

This latest approach ... guaranteed to be the last one ever until we think of something neater still... will make your computer totally transparent to Wordstar... at least in terms of the hassles of the keyboard. It is derived from the unhooking program in November but it's neater, because it lives inside Wordstar itself. What fun!

The Enemy Within

Whenever Wordstar comes on it jumps to location 02A4H prior to actually becoming a word processor. The content of this location is usually a RET instruction, which sends the thing on its merry way. However,

if one were to put a jump in this spot and an address pointing to some sort of routine, one would have Wordstar which would run some kind of initialization trip prior to actually doing its fundamental thing.

Three bytes down the road at 02A7H there is a similar non-jump which is called just before Wordstar snuffs it and returns to CP/M. It can be used to de-initialize the program.

At 020E0H there is a large swath of room to put more code in. It's specifically designed to hold patches to Wordstar that the heads that wrote it didn't think of.

Now, on to the problem. An Apple clone has a number of hassles when using Wordstar. To wit, many fruits, particularly the Untron beasts from Taiwan, have six incorrect bytes in their keyboard decoding ROMs. This causes the letters O,P,K,L,N and M to come out looking funny when the keyboard is in its lower case mode and you hit the shift key. Secondly, the Videx eighty column card, and clones thereof, set hooks into CP/M which trap all control A's and control K's, replacing the latter with a square bracket for use with the PIP command.

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```

```

PATCH EQU 0AB2DH+INDEX ;WHERE TO PATCH
NEW EQU 0AB2FH+INDEX ;WHAT TO PATCH
TABEXT EQU 0AB19H+INDEX ;TABLE INDEX
CHARTBL EQU 0F3ACH ;BIOS TABLE
;
MORPAT EQU 02E0H ;WORDSTAR PATCH AREA
UNISUB EQU 02A7H ;INITIALIZE JUMP
;
ORG MORPAT
;
LHLD PATCH ;SAVE OLD HOOK
SHLD OLDHOOK
;
LXI H,NEW ;UNHOOK THE CARD
SHLD PATCH ;
;
LXI H,TABLE ;POINT TO LOCAL TABLE
LXI D,CHARTBL ;POINT TO TABLE IN BIOS
LOOP1 MOV A,M ;GET BYTE
CPI '$' ;DONE?
JZ BYE ;
STAX D ;SAVE BYTE
INX H ;BUMP
INX D ;...POINTERS
JMP LOOP1 ;LOOP 'TIL DONE
;
BYE MVI A,7 ;FUDGE TABLE LENGTH
STA TABEXT ;BYTE
;
MVI A,JMP ;PUT IN NEW WS JUMP
STA UNISUB ;TO DEINITIALIZE
LXI H,DEINIT ;POINT IT TO DEINIT
SHLD UNISUB+1
;
RET ;RUN WORDSTAR
DEINIT:
MVI A,6 ;SHORTEN TABLE BY ONE
STA TABEXT
;
LHLD OLDHOOK ;REHOOK THE CARD
SHLD PATCH
;
RET ;BACK TO CP/M
;
TABLE DB 5FH,4FH,40H,50H,7BH,4BH,7CH,4CH
DB 7EH,4EH,7DH,4DH
;
IF BACKRUB
DB 0BH,7FH
ELSE
DB 15H,7FH
ENDIF
DB '$'
;
OLDHOOK DS 2
;
END

```

Apples and Wordstar are not entirely friendly. Apple compatible systems equipped with Videx type eighty column cards do a number of unpleasant things to this popular word processor. While there are simple cures for this... such as the Last Unhooker in this issue... they all involve some delicate code hacking.

The Fixer solves this problem. Place it on the same disk as your copy of WS.COM, type FIXER and after a suitable amount of disk noise you will have APWS.COM on there too. This version of Wordstar includes special patching and unhooking code which runs each time you boot Wordstar and makes your fruit behave as it should. It releases the control K's, translates the left arrow key to a delete character and patches Unitrón keyboards.

In addition to all of this, the fixer allows you to set some of the defaults of Wordstar which the MicroPro INSTALL package don't really get to. All of these features are menu driven in English for absolute non-technical operation.

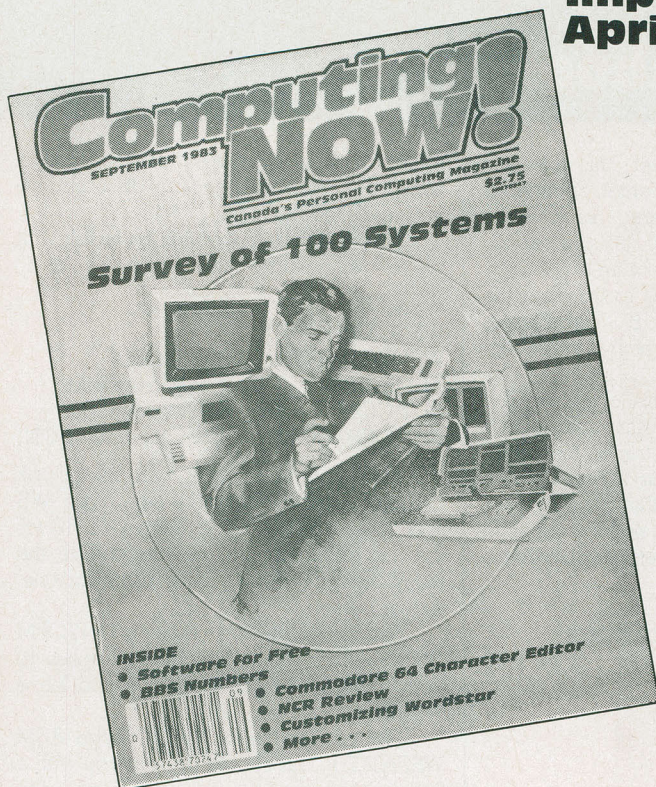
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The Very Last Apple Unhook

The control K is the character required to save files from Wordstar... not a trivial matter, this.

Third, the left arrow key on the Apple's keyboard produces a control H backspace character rather than the 7FH RUB character Wordstar needs for rubbing out text.

As you'll see in the unhooking program presented in November, this can be handled with a two step shuffle and fix. First, you can remove the hooks from the Videx card without actually disturbing the card itself. Secondly, putting a translation table in the BIOS fixes the character freakouts and allows defining one key as a RUB.

The ideal key to use for RUB is the left arrow backspace. In fact, control H and control S have the same function in Wordstar, and one normally uses control S, so this

is not a problem. However, this does get tricky when you want to enter commands on the CP/M command line... such as the one to run Wordstar itself... as you can no longer backspace to correct an error.

The next best thing is to translate the right arrow to use as a RUB... this disables the control U character, which is infrequently used.

There is a solution to this, of course. The ideal trip is to have Wordstar itself unhook the card and install the translation table. When you leave Wordstar it replaces the Videx hooks and stops the translation of control H to RUB. There is nothing to hassle over, and nothing to run before you can use Wordstar.

Patches on The Old Rags

Getting Wordstar to do this for you will take

about a half an hour. It's pretty straightforward, but work with backup disks in case you freak the thing out.

To get going, you will need a disk with the following stuff on it.

WS.COM	;Wordstar
WSOVLY1.OVR	
WSMSG5.OVR	;Overlays
ASM.COM	;CP/M assembler
DDT.COM	;CP/M debugger
UNHOOK.COM	;from November CN!

First, unhook the disk with the unhook program from November. Now type WS and, when you get to the main menu, N, for the non-document editing mode. Call the file WSPATCH.ASM. Enter program one, shown here.

Set one of the size equates, TINYCPM or BIGCPM, true... whichever applies to your system. Now save the file and leave Wordstar.

Get set for the tricky bit. Type ASM WSPATCH. This should present you with a few numbers and no error messages... the latter would indicate that you have a typo in your WSPATCH file. You should find that there is a file on your disk called WSPATCH.HEX when the sheep stop flying. All is cool so far.

Type ERA *.PRN to get rid of the assembler flotsam.

Next, do a DDT WS.COM. If you type D02A4 you will see the memory you are going to patch. Most of it will be zeros with a few C9's... RET's... scattered about. Do IWSPATCH.HEX followed by R. The drives will whirr. Next do A02A4 and, when the computer says 02A4, type JMP 02E0. Type a period on the next line and repeat the D02A4 command. You should see a memory dump like that in figure one.

Now leave DDT by typing G0... that's a zero "O"... and, when you get back to CP/M, SAVE 63 APWS.COM.

A bit of a thrill, wasn't it...

Run For It

If you turn your Apple on and off and run APWS you should find that Wordstar behaves totally properly. All the keyboard keys will work as they should. The left arrow will delete characters and control K's will not come up as square brackets. If you thereupon leave the program, the control K's will revert to their former glory, and you'll be able to set the toggles in PIP.

It all sounds very small, to be sure, but this simple patch will make your fruit a much easier word processor to work with... and it might save it from getting beat up, if you are not of a mind to keep remembering to run the unhooker.

CN!

```
DDT WS.COM
DDT VERS 2.2
NEXT PC
3F00 0100
-D02A4
02A4 C9 00 C9 C9 00 C9 00 00 00 0A 05 .....
02B0 00 00 00 00 00 00 00 00 00 00 C9 00 00 C9 .....
02C0 00 00 C9 00 00 C9 00 00 00 00 C9 00 00 03 .....
02D0 09 19 40 09 00 00 00 00 01 01 00 00 01 14 00 00 ..@.....
02E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
02F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0300 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0310 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0320 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0330 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0340 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0350 00 00 00 00 00 00 00 00 00 00 00 00 49 78 03 FF .....Ix..
-IWSPATCH.HEX
-R
NEXT PC
3F00 0000
-A02A4
02A4 JMP 02E0
02A7 .
-D02A4
02A4 C3 DE 02 C9 00 C9 00 00 00 0A 05 .....
02B0 00 00 00 00 00 00 00 00 00 00 00 C9 00 00 C9 .....
02C0 00 00 C9 00 00 C9 00 00 00 00 C9 00 00 03 .....
02D0 09 19 40 09 00 00 00 00 01 01 00 00 01 14 00 00 ..@.....
02E0 2A 2D AB 22 2A 03 21 2F AB 22 2D AB 21 1B 03 11 $-."$./."-!...
02F0 AC F3 7E FE 24 CA FE 02 12 23 13 C3 F2 02 3E 07 ..^.$...$...>.
0300 32 19 AB 3E C3 32 A7 02 21 0F 03 22 AB 02 C9 3E 2...>.2...!...">
0310 06 32 19 AB 2A 2A 03 22 2D AB C9 5F 4F 40 50 7B .2...$."-..._oEP(
0320 4B 7C 4C 7E 4E 7D 4D 08 7F 24 00 00 00 00 00 KIL^N}M..$. ....
0330 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0340 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0350 00 00 00 00 00 00 00 00 00 00 00 00 49 78 03 FF .....Ix..
```

This is the DDT procedure required to put the last unhook into Wordstar. The code in the bottom dump may change slightly if you set the conditionals in the unhooker differently.

Survey of Business Computer DOCS



If we all lived in a utopian paradise, business users would know by instinct which computer system is best for them, and they'd also know how to use every new software package as soon as they got it home from the store. Indeed, there'd be no need for the books presented below.

Unfortunately, utopia isn't due until at least the next federal election, and businesses, at first glance, appear to be at the mercy of the hardware and software manufacturers for the documentation that they require, and sometimes so desperately lack.

It would be a tragedy if this were entirely true, but many manufacturers do try to downplay the importance of their product's documentation. Companies have produced manuals ranging in quality from photocopied wonders on recycled newsprint to works twice the thickness of

War and Peace; many of these things turn out to be as readable as the ingredients panel on a box of freeze-dried pizza.

Perhaps this is why books written by independent authors are so popular. These writers aren't compromised by company deadlines that dictate that the product's introduction timetable is more important than the manual's quality. They can take all of the time necessary to learn the intricacies of the product in question. Written by actual wordsmiths, the books can be read and understood by practically anyone needing the information, even people without any

technical background at all. These books are just the thing when the new software comes in Tuesday and all of the old files have to be converted before the weekend.

A large number of the following books focus on the potential user who has had no computer experience, but who has still felt the call to computerize the office. Most of the books in this category are tutorials on purchasing and things to be wary of.

Whether you need better documentation of business software or instruction or help in office computerization, you'll likely find something of interest here.

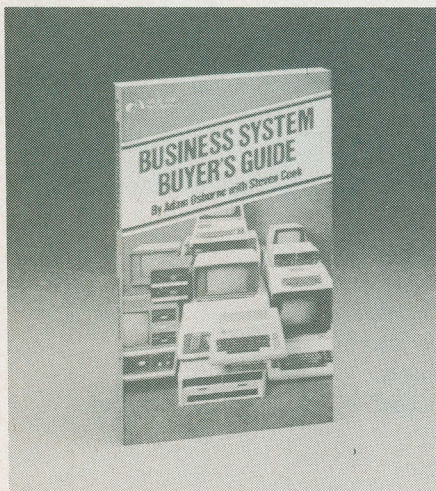
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A Guide for Selecting Computers and Programs for Small Business, by P. Enockson. An overview of the purchasing of a system and its software, and installation of same in an office environment. \$19.95. CN! Book Service.

A Manager's Guide to Local Networks, by F. Derfler, Jr. and W. Stallings. Productivity and growth can be improved with a managerial understanding of local network systems. This book shows how. \$19.95. CN! Book Service.

BASIC Business Software, by E.G. Bronner. Prepared programs in this book can be run and evaluated to explain the fundamentals of business software. A number of ready to run programs are included. \$17.25. Lenbrook.

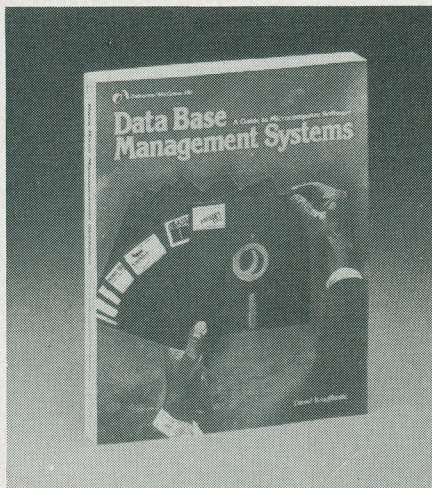
BASIC Systems Analysis, by A. Daniels and D. Yeats. For the systems analyst to be, this comprehensive book provides an introduction to the field along with basic training. Background material for business users is provided. \$15.85. Lenbrook.



Business System Buyer's Guide, by A. Osborne and S. Cook. An explanation of what small computer systems can do, and what their limitations are. For the prospective, yet cautious buyer. \$13.50. McGraw Hill.

Choosing a Word Processor, by P. Good. Compares one hundred and fifty-seven features of twenty-one leading word processing systems, and features handy checklists. \$16.95. CN! Book Service.

Computer Power for the Small Business, by C. Sippl and F. Dahl. Explains both how computers work, and how to develop a step by step plan for an individualized computer system. \$10.95. CN! Book Service.



Data Base Management Systems, by D. Kruglinski. Evaluation and selection of a DBMS to meet your needs will be an easy matter after reading this book. A number of data base systems are critically examined. \$22.95. McGraw Hill.

Data Base Systems: Design, Implementation and Management, by R. Ross. A comprehensive look at data bases and data base management systems, in their most common forms. \$29.00. CN! Book Service.

dBase II User's Guide, by A. Green. Explained in easy to understand language, this handbook teaches the power of dBase II to both novice and seasoned user. \$38.00. CN! Book Service.

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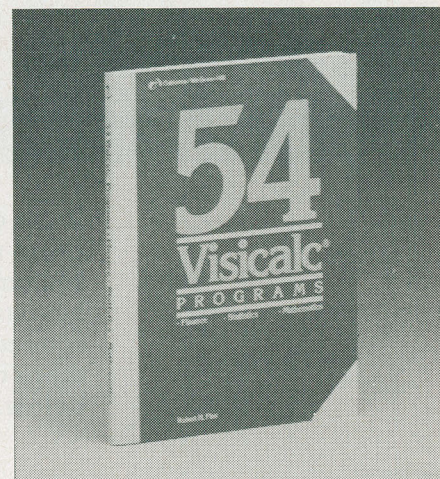
How To Buy An Office Computer Or Word Processor, by P. Donohue. This book covers finding, purchasing, and utilizing the system best suited for your needs. \$11.95. CN! Book Service.

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How To Manage Your Small Computer... Without Frustration, by H. Segal and J. Berst. This book covers installation of a unit, staff preparation, and possible profits to be had with excess system time. \$19.95. CN! Book Service.

How To Profit From Your Personal Computer: Professional, Business, and Home Applications, by Lewis. Utilise your computer for profit, through accounting, mailing lists, inventory and the like. \$18.95. CN! Book Service.

How To Select Your Small Computer... Without Frustration, by H. Segal and J. Berst. A guide to use when first buying a micro. Outlines common mistakes and popular choices of software and hardware. \$19.95. CN! Book Service.



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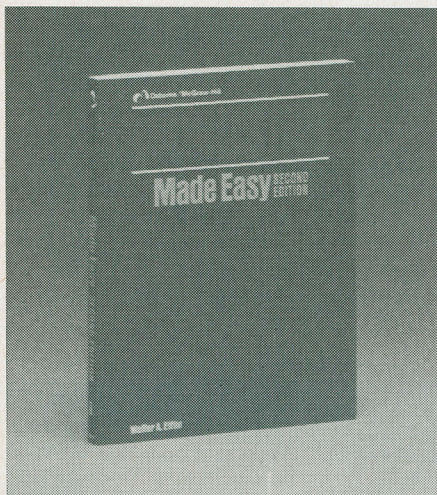
How To Use VisiCalc/SuperCalc, by Shrum. Just the book for novice staff. Simple step by step tutorial to these two popular software packages. \$3.95. CN! Book Service.

How To Computerize Your Small Business, by J. Cohen and C. McKinney.

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WordStar Made Easy, by W. Ettlin. This simple to learn reference guide introduces the user to the power of WordStar in business applications. A quick reference pull-out card is included. \$17.50. McGraw Hill.

Microcomputer Data Base Management, by Freiling. This complete tutorial supplies routines the user can utilise, and compares information about three popular data base programs. \$18.50. CN! Book Service.

Microcomputers For Accountants, by T. Needleman. Written by a specialist, this book show accountants how best to employ their microcomputers to better serve their clients, and better manage their practice. \$19.95. CN! Book Service.

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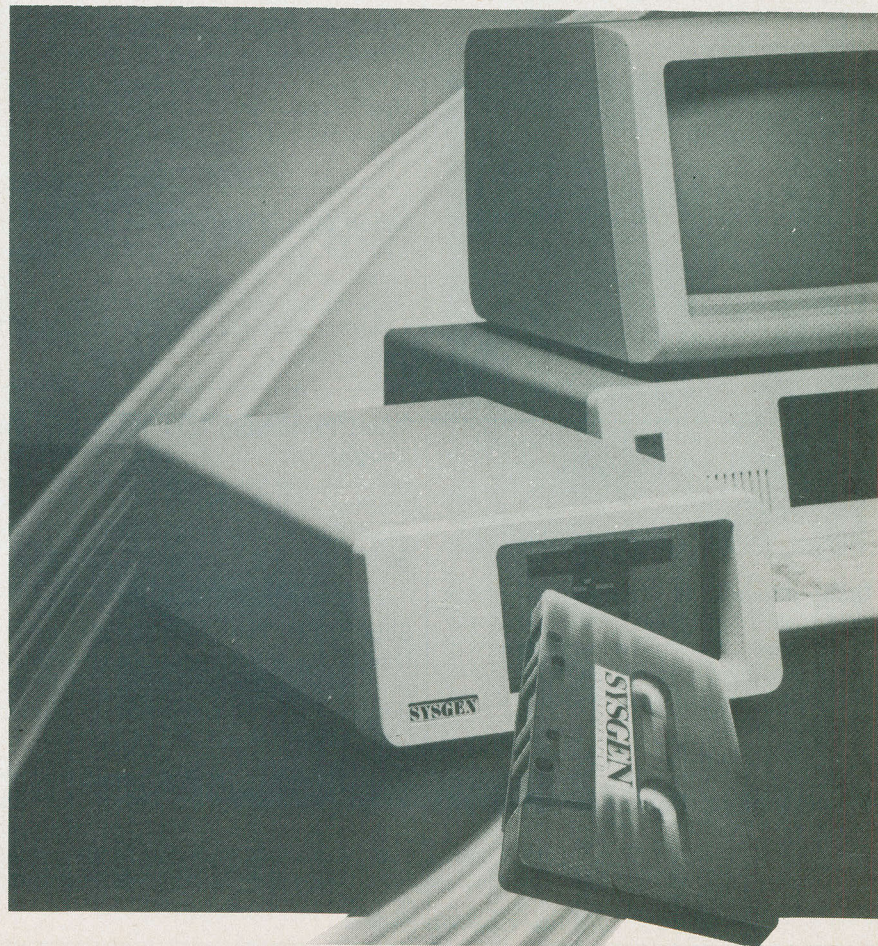
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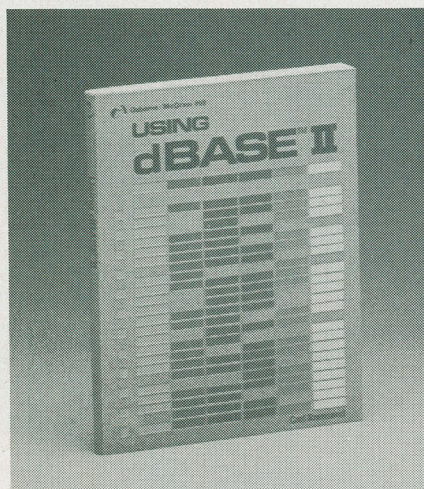
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Microcomputers In Large Organizations, by T. Madron. This book covers planned microcomputer implementation in large organizations, and is aimed at business and data processing managers. \$16.95. CN! Book Service.

Microcomputers In Small Business, by R. Randall. For the business user with little or no computer experience, this book is a detailed introduction to the use of micros in the office environment. \$11.95. CN! Book Service.

On-line Computing for Small Business, by Silve, Jeacocke and Welland. Instruction aimed at small business managers outlining the benefits of on-line computing. Written for the novice in clear, easy to understand language. \$7.65. Lenbrook.

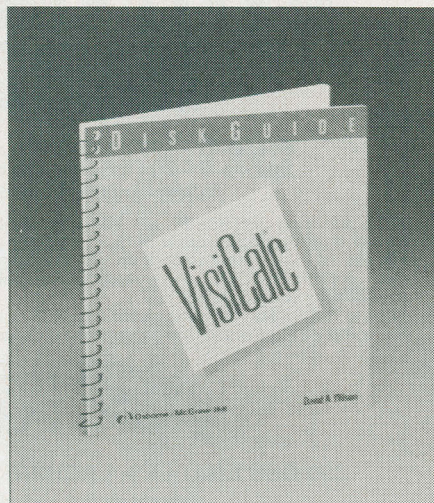
Simple BASIC Programs For Business Applications, by J. Alonso. This book includes BASIC programs and subroutines to aid the user in business applications. The programs may be modified for specific purposes. \$19.95. CN! Book Service.



Using dBase II, by C. Townsend. A book aimed at the business professional who wants to design customized programs with dBase II. Areas from installation to Structured programming are covered. \$25.50. McGraw Hill.

Understanding Data Base Management, by Freiling. Covers the creation, maintenance, and utilisation of data bases, providing an overview for business managers. \$3.95. CN! Book Service.

So You Are Thinking About A Small Business Computer, by R. Canning and N. Leeper. Describing the selection and ultimate use of a small computer system in the office environment, this book is geared to buyers with little to no experience in micros. \$14.95. CN! Book Service.



VisiCalc DiskGuide, by D. Wilson. All VisiCalc's commands are shown in this handy guide with examples of their usage. Special keys, entries, commands and files are located at a glance. \$9.50. McGraw Hill.

Using Microcomputers in Business, by Veit. An essential guide for the purchase of either computer systems or software. Answers the most asked questions in a fast moving, nontechnical style. \$15.95. CN! Book Service.

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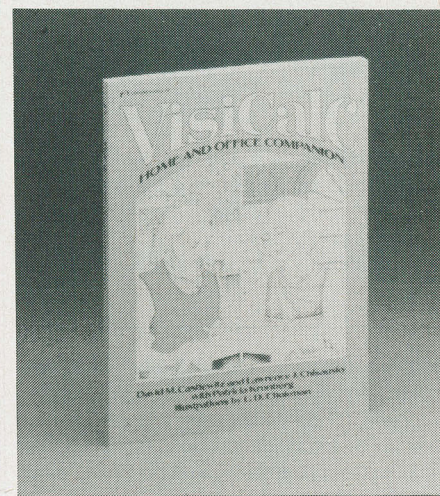
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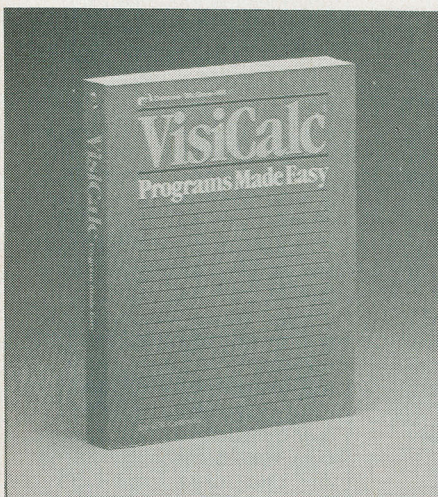


VisiCalc Home and Office Companion, by D. Castlewitz and L. Chisauksy. Invaluable for those starting to use VisiCalc, this book is conveniently arranged by application and supplies numerous models for business and home use. \$21.50. McGraw Hill.

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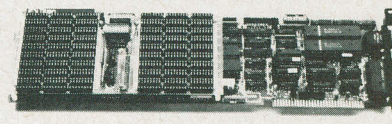
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New Products

Micro Floppy Drives

A new series of microfloppy disk drives using a standard five and a quarter inch interface and three and a quarter inch flexible media has been introduced by MPI.

The new low-cost Model 321 and Model 322, featuring single-sided five hundred kilobyte and double-sided one megabyte storage capacities are a response to market needs for high capacity microfloppies. The small footprint, light weight and low power consumption make them ideal for desktop microcomputers, portable computers, stand-alone terminals, word processors and many other applications.

The Models 321 and 322 use the familiar flexible-jacket technology already proven with eight inch and five and one quarter inch floppies, that can be produced with the same equipment. Manufacturing the three and one quarter inch, with fewer parts per unit than the semi-hardshelled disk results in high-volume production which is available now. Multiple high-volume sources include Dysan Corporation, Brown Disc Corporation and 3M.

The microfloppies have a track-to-track access time of six milliseconds. Major components include a direct drive spindle motor and a unique long-life lead screw head-actuator mechanism that records at one hundred and forty tracks per inch.

Featuring a small size and reduced weight, the drives weigh one and a half pounds and measure about one and a half inches high by four inches wide by five and a half inches deep, which is the same package size as micro-Winchesters now being introduced.

The drives are plug compatible with standard double-sided, double-density, five and one quarter inch drive. Media format, eighty tracks per side, make them data compatible with standard five and one quarter inch drives as well. Plug and data-format compatibility allows users to download double-sided, five and one quarter inch software packages to the unit's three and one quarter inch diskettes

with no modification.

MPI is offering immediate delivery of the Model 321 and will begin delivery of the Model 322 in the first quarter of 1984.

For more information, contact MPI at 9754 Deering Avenue, Chatsworth, CA, 91311, (213)709-4202.

IBM Graphics

Until now, memory and processing speed have been limiting factors. Too much of a small system's resources were required to produce complex images quickly. Conography™, an advanced graphics technology, helps to solve that problem by building images with less data. This means fewer calculations, and faster image buildup and transmission, with significantly reduced data storage requirements.

The Cono-Graph system, the first graphics product incorporating conography for the IBM PC has been introduced by Conographic Corporation.

Conography uses conic curves for graphics and motion control. Conic segments are drawn directly, without the intermediate step of approximating curves with straight line segments. A rich variety of Conographic curves may be used like a draftsman's spline to create curved edges that are visually pleasing or useful. Conographic primitives include circles, circular arcs, ellipses, elliptical arcs, and straight lines (vectors). These Conographic curves may be manipulated as easily as vectors, but have preferable analytic properties. For example, every Conographic curve is infinitely differentiable at each point. Conography is to curves what vectors are to straight lines.

Another advantage of Conography is device independence. Graphic descriptions of objects using Conographic curves are independent of output device properties like horizontal and vertical resolution. This means graphic objects can be reproduced on different devices, or different computers (with an appropriate graphics driver), and the soft-

ware algorithms used to perform common graphics transforms like scaling, need not take into account output device resolution.

Using Conographic curves, the data needed to describe an object are significantly reduced, thereby also reducing the amount of memory needed to store the data, the number of calculations required to compute the image, and the amount of time required to transmit it. Depending on the application, data may typically be compressed twenty or fifty to one. A compression ratio of one hundred to one is not unusual.

The Cono-Graph system includes the Cono-Colour adapter, which provides a large number of colours and high resolution, and the Cono-Gen module, for increased processing power and speed. Two versions of the Cono-Colour adapter are now available for the IBM PC or PC-XT, the stand alone model and the expandable version which includes an interface to the Cono-Gen. The add on Cono-Gen module will be available in early 1984.

The Cono-Colour adapter is used in lieu of the IBM Colour/Graphics adapter, and is compatible with it in both text and graphics modes, so all of the standard graphics programs developed for the IBM adapter can be run without modification. The Cono-Colour adapter is equipped with one hundred and twenty-eight kilobytes of high speed memory, and an architectural design that yields clean, crisp, flicker-free images in a multitude of colours.

In addition to the faithful reproduction of the IBM support modes, the Cono-Colour Adapter delivers alternate modes including the higher resolutions of 640x400 and 512x512 pixels. At any resolution, users can select a palette of 16 colours for simultaneous on-screen display, from a spectrum of 256 colours. A colour map lets the user modify the palette dynamically, for instantaneous colour changes and special effects, including motion. The Cono-Colour

Adapter also features a light pen interface with resolution improved to 1 pixel, multiple video display pages, wrap around panning, hardware scrolling, dual character fonts, high speed erase, and outputs to digital and analog RGB and composite video monitors. All IBM advanced BASIC graphic functions are fully supported.

Conographic Corporation offers two optional packages for use with the Cono-Colour Adapter; Cono-Curve, which provides the fundamental Conographic technology, and the supporting utility Cono-Lib. Cono-Lib provides a graphics commands to allow the user to create a library of images. Cono-Lib commands include scaling routines for screen reference, area filling routines such as FILL TO, FILL ONLY, mixed coloured fills, and windowing. Other functions are supported, including on-line colour selection, screen modification of non-displayed pages, quick mode changes for different resolutions, and a variety of user-definable characters, colours, and methods. By calling on Cono-Curve, Cono-Lib's Conographic curve generators provide complete flexibility in creating curves, including texturing, colour definitions, and one-to-four quadrant plotting. One primitive call will generate the entire curve of a simple equation, with windowing. In addition, Cono-Lib supports drivers to graphics I/O devices like digitizers, joysticks, mice, plotters, and printers.

The Cono-Graph system is marketed by Conographic Corporation, 2268 Golden Circle, Newport Beach, CA 92660, (714)474-1180.

Professional Computer

Lanier Business Products, Inc. has introduced a new professional computer, called the Lanier Business Processor 1000. Lanier's professional computer is designed to place personal computing within the grand scheme of office automation.

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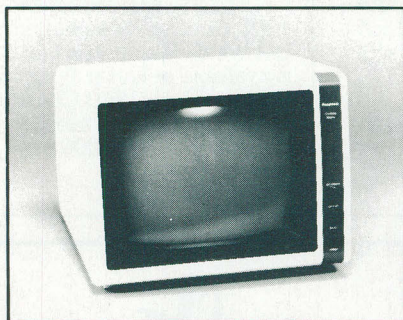
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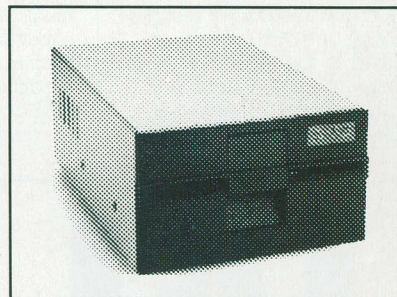
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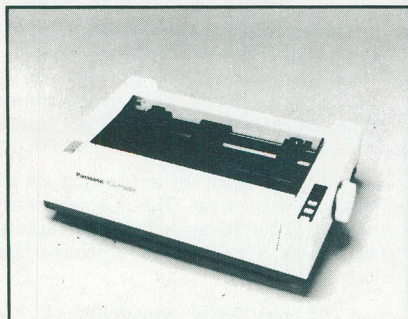
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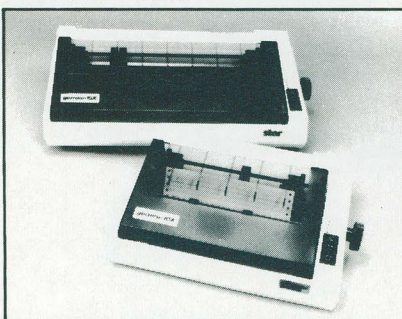
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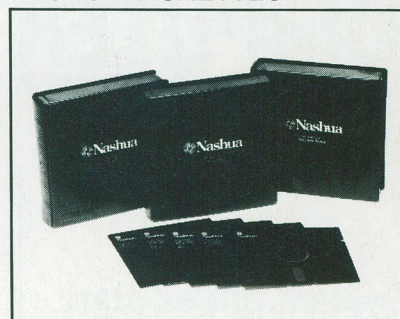
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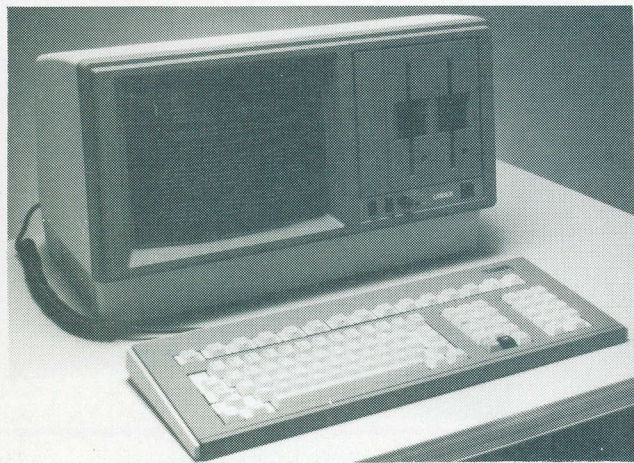


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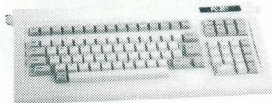
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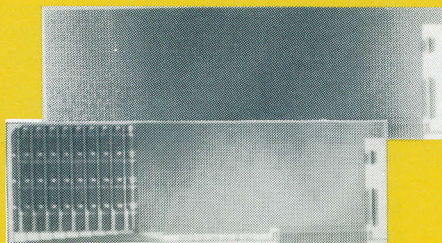
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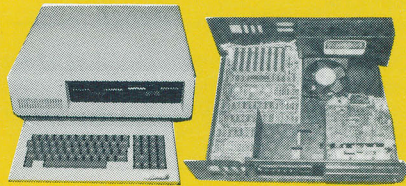
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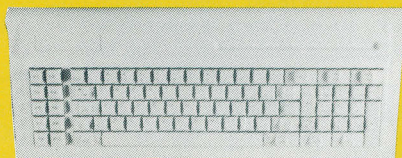
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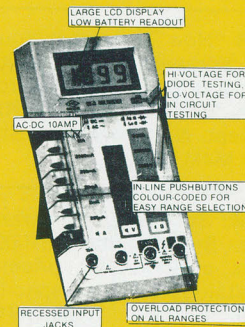
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Readers are invited to submit programs for LIST!. They should be printed out with a reasonably new ribbon... we cannot accept hand written or hand typed software... and of a length that can be dealt with in one printed page or so (or less). We suggest that the author's name and address appear somewhere in the listing. We pay for programs on publication.

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```

1 REM*****
2 REM*
3 REM* C-ITOH-SKYMAN HIRES DUMP *
4 REM* UTILITY *
5 REM* BY TODD ZIEGLER *
6 REM* SCARBOROUGH, CANADA *
7 REM*
8 REM* 30/11/83 *
9 REM*****
10 DIMA$(10):DIMP$(2):DIML$(3):DIMG$
20 D$=CHR$(4)
21 GOSUB200
32 HOME
33 PRINT"0=PICA 80 D/I"
34 PRINT"1=ELITE 96 D/I"
35 PRINT"2=CONDENSED 136 D/I"
36 PRINT"3=PROPORTIONAL 160 D/I"
37 VTAB(23)
40 INPUT"PITCH?";P$
42 HOME
43 PRINT"64 AND"
44 PRINT"32 OR"
45 PRINT"16 EOR"
46 PRINT" 8 INVERT SCREEN 2"
47 PRINT" 4 INVERT SCREEN 1"
48 PRINT"0-3 COLOR SET CHANGE"
49 PRINT"128 OVERLAY"
50 VTAB(23):INPUT"LOGIC?";L$

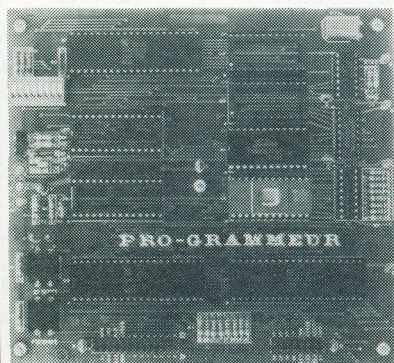
```

```

51 HOME:PRINT" NORMAL INVERTED"
52 PRINT
53 PRINT" B+W COLOR B+W COLOR":PRINT
54 PRINT" 1 3 5 7 -PAGE 1"
55 PRINT
56 PRINT" 9 B D F -PAGE 2"
60 VTAB(23):INPUT"TYPE?";G$
61 HOME:PRINT" SIZE":PRINT:PRINT
62 PRINT" X1 X2 X3 X4":PRINT
63 PRINT"X1 0 1 2 3"
64 PRINT"X2 4 5 6 7"
65 PRINT"X3 8 9 A B"
67 VTAB(23)
70 INPUT"SIZE?";S$
71 PRINT"VIEW PICTURE? Y/N":GETM$:PRINTM$
72 IFM$="Y"THEN74:IFM$<>"N"THEN71
73 GOTO90
74 INPUT"SCREEN 1 OR 2 ? ";V
75 IFV=1THENPOKE-16304,0:POKE-16301,
0:POKE-16300,0:POKE-16297,0
76 IFV=2THENPOKE-16304,0:POKE-16301,
0:POKE-16299,0:POKE-16297,0
77 GOTO71
90 POKE1273,161
95 PR#1
97 PRINTCHR$(27)
100 PRINT"!E"P$P";
110 PRINT"!E"L$G";
120 PRINT"!G"G$S$:""
130 PR#0
140 END
200 REM-WHICH SCREEN
202 HOME
205 PRINTD$;"CATALOG"
207 VTAB(23)
208 INPUT"PICTURE TO LOAD?";A$
210 INPUT"WHICH SCREEN? 1-2 ";Q
212 IFQ<1ORQ>2THEN210:IFQ=1THEN214:IFQ=2THEN216
214 PRINTD$;"BLOAD"A$,A$2000"
216 PRINTD$;"BLOAD"A$,A$4000"
217 PRINT"LOAD OTHER SCREEN? Y/N":GETB$:PRINTB$
218 IFB$="Y"THEN202
219 RETURN

```

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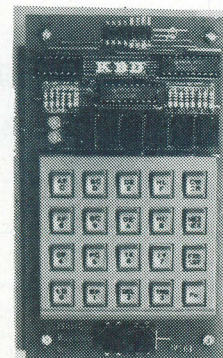
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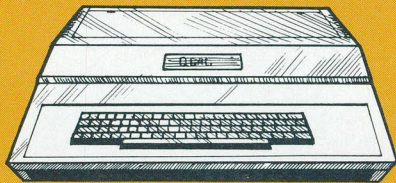
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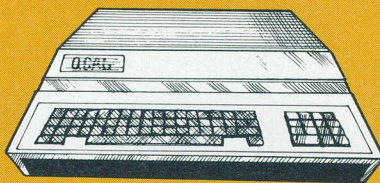
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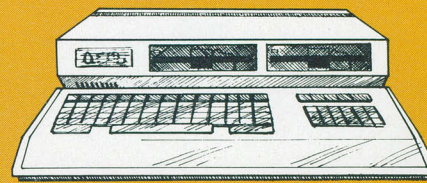
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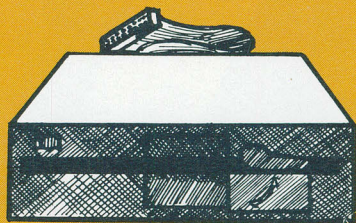
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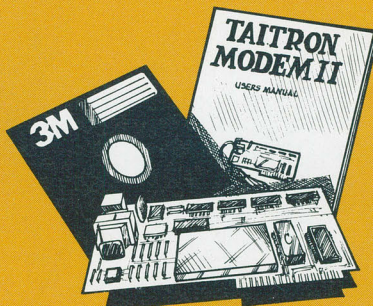
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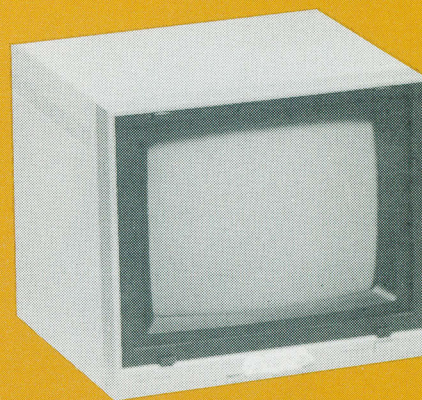
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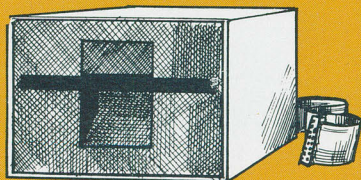
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Correction: QCAL power supply is EPB-approved, not CSA-approved as indicated in the February, 1984 issue of Computing Now.

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